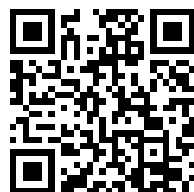

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THE NAVAL ANNUAL, 1909.

EDITED BY

T. A. BRASSEY, A.I.N.A.,

Honorary Fellow of Balliol; Commander of the Order of the Crown of Italy.

“The safety of the Empire stands above all other considerations. No matter what the cost, the safety of the country must be assured.”

FIRST LORD'S SPEECH ON NAVY ESTIMATES,
March 16th, 1909.

PART I.—THE MARQUIS OF GRAHAM; LORD BRASSEY, G.C.B.;
Vice-Admiral W. H. HENDERSON; JOHN LEYLAND;
ALEXR. RICHARDSON, HERBERT RUSSELL, and the
EDITOR.

PART II.—List of Ships: Commander CHAS. N. ROBINSON, R.N.,
and JOHN LEYLAND.
Plans of Ships: S. W. BARNABY, M.I.N.A.

PART III.—Armour and Ordnance: Commander C. N. ROBINSON,
R.N.

PART IV.—FIRST LORD'S MEMORANDUM; BRITISH AND FOREIGN
ESTIMATES.

1909.

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1909

PREFACE.

IN the last number of the *Naval Annual* we commented on the practice, recently adopted in our own and certain foreign navies, of withholding particulars of ships for the construction of which provision is made in the Estimates, as most unlikely (as far as this country is concerned), to prevent those obtaining information from whom it may be desirable to conceal it. In the United States no such concealment is attempted. The designs of ships are openly discussed, and Congress insists on being furnished with information as to the leading features of new ships before voting the money for their construction. There is no reason to suppose that the United States Navy suffers from this publicity. There is, on the other hand, good reason to believe that the practice initiated by the British Government in the case of the Dreadnought, and copied with greater success in Germany, is in no small measure responsible for the scare produced by the Debate on the Navy Estimates on March 16th.

This debate took place when this volume was already in print, and necessitated the revision of several passages. Almost daily up to the moment of going to press fresh information has been forthcoming which has suggested further modifications. Within the last fortnight there has been the offer of one or, if necessary, two battle-ships for the Royal Navy by the Dominion of New Zealand; a similar offer has come from the colonies of New South Wales and Victoria (a striking anticipation of the suggestion made at the conclusion of Chapters I and III), and we have read the not altogether satisfactory reply of the Imperial Government to the Government of New Zealand, the statement of Admiral von Tirpitz as to the German programme of construction, and of the pressure brought to bear by Germany on Russia in order to compel the latter to modify her attitude on the Servian question.

The danger to our naval supremacy at the present moment and in the immediate future has undoubtedly been much exaggerated in certain quarters. The salient features in the situation with which we have to deal are the determination of Germany to become a great Naval Power, and the tendencies of German policy, described in Mr. Frederic Harrison's letters to the *Times* (reprinted

in Part IV). Germany has an absolute right to increase her Navy as she pleases, but her naval activity imposes increased exertions on ourselves. Owing to the liberality of expenditure on new construction in the years preceding 1907 our naval position is at the present moment secure. A comparison of relative strength cannot be confined to Dreadnoughts. Many competent authorities do not consider the all-big-gun ship the best type. Our position for the future is not secure, for the simple reason that expenditure on new construction has been recently cut down, and in consequence at the time this volume is published there will only be five battleships under construction for the British Navy as compared with ten (at any rate nine) for Germany and six for the United States. In July two ships, and in November two more ships, are to be laid down in Great Britain. By November the *Superb* as well as two of the German ships will have been completed, and two ships will have been laid down in the United States; so that the figures at the end of the year will probably be eight battleships building for Great Britain as compared with sixteen for the German and United States Navies. The two-Power standard cannot be maintained on our present scale of expenditure on new construction, which for the years 1908 and 1909 is roughly equivalent to that of Germany alone. The Cawdor programme of new construction was abandoned in 1908-9 when only one battleship and one cruiser battleship were laid down. The construction programme of 1909-10 should have made good the deficiency. If provision had been made for laying down six (or better seven) battleships there would have been no good cause for agitation.

The expansion already accomplished, and still in progress, of German resources for the building of war ships, and the supply of guns, armour, and machinery is another factor in the situation which must be borne in mind. Great though that expansion has been, the resources which we possess in the great private establishments of Armstrong, Vickers, J. Brown and Co., and others, are still superior to those of Germany. In order, however, that these resources may be maintained, if not developed, it is essential that these firms should have in the future a better assurance of the continuity of Government orders than they have had in the past.

Part I of the *Naval Annual* for 1909, apart from the usual articles, contains papers on German Naval Expansion by Mr. Leyland, on the Naval Volunteer Reserve by a very energetic officer of the force, the Marquis of Graham, and on Dockyard Administration by Admiral W. H. Henderson (in collaboration with Mr. Russell) who was recently Superintendent of Devonport Dockyard.

In Part II an important new feature has been introduced. The leading particulars of ships are given on the Plates as well as in the lists. In spite of repeated suggestions that the lists of ships should be arranged in classes, the arrangement in alphabetical order has been retained as more convenient for purposes of reference.

Part IV, in addition to the usual matter, contains the speech of the First Lord on the Navy Estimates, Mr. Harrison's letters to the *Times*, already alluded to, and the paper read by Lord Brassey at the spring meeting of the Institute of Naval Architects, which, by the courtesy of the council, we are permitted to republish.

In conclusion, we must again express our thanks to those who have been good enough to point out errors in former volumes. It is twenty years since the present editor first became responsible for the publication of the *Naval Annual*. The difficulty of securing accuracy does not tend to diminish.

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PART I.

CHAPTER I.

BRITISH NAVY.

THE battleship *Agamemnon* was commissioned in June, 1903, for service in the Home Fleet. New construction.

The completion of the *Lord Nelson* has been very much delayed. Though launched in September, 1906, she was not commissioned until January of the present year. The following particulars of the trials are taken from *Engineering* :—

Name.	Makers of Machinery.	At one-fifth Power.		At four-fifths Power.		At full Power.	
		I.H.P.	Coal.	I.H.P.	Coal.	I.H.P.	Coal.
Lord Nelson ...	Palmers... ..	3,624	lbs. 2·23	12,232	lbs. 1·93	17,445	lbs. 1·99

On the full-power trial the speed attained is said to have been 18·9 knots.

The *Bellerophon* went through her trials in October and November, 1908. On the thirty-hour trial, at 16,250 I.H.P., the turbine engines are reported to have done exceedingly well, an average speed of 19·5 knots being obtained. The *Bellerophon* was commissioned on February 20, 1909. The completion of the *Téméraire* will, according to the reply given by the First Lord of the Admiralty to a question in the House of Commons, be delayed about six months, and the date for commissioning will probably be May, 1909. The full-power trial of the *Téméraire* took place early in March, and she is reported to have attained an average speed of 21·5 knots. The contract date for the delivery of the *Superb* was January 4, 1909, but this date, in view of labour troubles, has been exceeded. These ships are of 18,600 tons displacement, and therefore some 700 tons bigger than the *Dreadnought*. The main armament consists of ten 12-in. and sixteen 4-in. guns. Pro-gramme, 1906-7.

The *St. Vincent* was laid down at Portsmouth on December 30, 1907, and launched on September 10, 1908. Displacement, 19,250 tons. The *Collingwood*, which was laid down at Devonport on February 3, 1908, was launched on November 7. The third ship of the class, the *Vanguard*, which was laid down at Messrs. Pro-gramme, 1907-8.

Vickers' yard at Barrow on April 2, 1908, was launched on February 22, 1909.

Pro-
gramme
1908-9.

The Neptune was commenced at Portsmouth on January 9, 1909. Displacement, 20,250 tons; length, 510 ft.; beam, 86 ft. The dimensions thus show a further progressive increase in the size of vessels of this type. The main armament will probably consist of ten 12-in. guns, while the anti-torpedo armament may consist of 4·7-in guns. It is believed that the turrets, which in the Dreadnought are placed abreast on either bow, will, in the light of the experience gained with the Indomitable class, be placed in échelon, thus enabling the whole of the 12-in. guns to be fired on either side.

Dread-
nought
type.

The design of the battleships of the Dreadnought type has been attacked by the powerful pen of Sir William White. One of the main points in his criticism is that the side armour would be frequently submerged in a seaway, and that injuries to the unprotected area of side would "involve the admission of quantities of water above the protected deck, and lead to consequent loss of buoyancy and stability, with possibly disastrous results to the vessel, although her armoured portions may remain intact." Sir William White is in favour of the retention of a proportion of 6-in. guns in the armament of battleships. Sir William White's criticisms were replied to by Professor Biles in the *Times* of July 23, in which he pointed out that the designs of the Dreadnought and Invincible represented "the deliberate judgment of the Board of Admiralty, the technical skill of the present Director of Naval Construction, and the unanimous advice of the representative Committee on Designs."

Foreign
Dread-
noughts.

But the strongest justification for British shipbuilding policy is the fact that the all-big-gun type of battleship is being almost universally copied in foreign navies. The following table gives particulars that have been published of the principal battleships under construction. Except for the United States and Brazilian ships, these particulars are not absolutely reliable.

	British.	Germany.	United States.	Brazil.	Japan.	Italy.
	Bellerophon.	Posen.	Florida.	Minaes Geraes.		
Displacement .	18,600	18,307	22,000	19,500	20,800	19,000
I.H.P. . . .	23,000	25,000	—	24,500	26,500	30,000
Speed . . knots	21	19½	21	21	20	22?
Protection—belt	11	12-4	11	9-4	12	—
„ side	11	—	10	9-6	?	—
„ guns	11	11	11 & 5	9 & 6	?	—
Armament . . }	10 12-in.	12 11-in.	10 12-in.	12 12-in.	12 12-in.	12 12-in.
	16 4-in.	12 6·7-in.	14 5-in.	22 4·7-in.	12 4·7-in.	18 4·7-in.

The most noteworthy feature in the above comparison is that the Germans and Japanese accept some reduction in speed and carry a secondary armament of 6-in. guns. For effective fire control it is argued that one calibre of gun is better than two or more; but when the so-called anti-torpedo armament is increased in calibre from the 3-in. to the 4-in., 4·7-in. or 5-in. gun, it may well be doubted whether Sir William White is not right in the opinion that the armament should include a proportion of the 6-in. guns, which played such an important part in the battle of Tsushima.

In the St. Vincent class the displacement has now increased to 19,250 tons, and in the Neptune, the latest British battleship laid down, to 20,250 tons. The increased displacement has, as far as is known, been largely given to increasing the protection afforded to the hull. The same observation is apparently true of the United States Florida class, which have about the same displacement as the Neptune. As to whether a given weight is better devoted to increasing the powers of offence or defence, it is not without interest to recall the opinions of the late Lord Armstrong, expressed in a letter to Lord Dufferin's Committee on Designs in 1871. The fact that the 50-calibre 12-in. gun has an increased power of 30 per cent. over the 45-calibre 12-in. gun, and that 14-in. guns have been under consideration for the United States Navy, support the view of Lord Armstrong that the power of the gun will constantly overtake the power of defence, and render his opinions not unworthy of consideration at the present time, though given thirty-eight years ago. Lord Armstrong wrote:—

“Every addition to the weight carried for defence must be attended with a diminution of armament and of speed, unless the size of the ship be increased in a very rapid proportion. A continual addition, therefore, to the thickness of the armour involves either a continual reduction of offensive power, or such an increase in the size of the vessel and its consequent cost, as must limit the production of sea-going ships of war to a number inadequate for constituting an efficient Navy. In my opinion, armour should be wholly abandoned for the defence of the guns, and, except to a very limited extent, I doubt the expediency of using it even for the security of the ship. Where armour can be applied for deflecting projectiles, as at the bow of a ship, it would afford great protection without requiring to be very heavy; but in other cases, where it must be of great thickness to be effective, I think its advantage is not adequate to the sacrifices it involves. Water-tight compartments would alone be available against torpedoes, and it appears to me they would also afford the best security against the effect of penetration by projectiles at or below the water-line. If we were relieved from the dead-weight of

Powers of
offence
and de-
fence.

Lord
Arm-
strong's
views.

heavy armour, the gain of flotation would afford the means of enormously increasing the armament and the speed of the vessel. Or what would be better still, we should be enabled to reduce the size and increase the number of our ships, so that the loss of a single vessel should no longer be a national calamity, as at present. We could then have comparatively small sea-going ships, with abundance of speed, and heavily armed; and, happen what may, such vessels could never be out of date, for they would always be well adapted for protection of commerce, for colonial service, and for the attack of flotillas carrying an invading force."

The fact that our Navy is now, owing to strategic considerations, so largely concentrated in home waters is an argument for reopening the question as to whether it is advisable to build only battleships of the largest size, which render so many of our existing docks obsolete and involve a heavy expenditure on the construction of new docks to accommodate them. Three battleships are to be built for the Spanish Navy of 14,760 tons displacement. They are protected by a 9-in. belt, 7-in. armour on the side above the belt, with 10-in. and 7-in. armour respectively over the main and secondary armaments. The armament comprises eight 12-in. guns, or the same broadside fire as the Dreadnought. Something must be sacrificed to bring down dimensions. The speed is $19\frac{1}{2}$ knots as compared with 21 knots, and the coal supply is smaller than in the Dreadnoughts. The type appears not unworthy of consideration by the British Navy for service in the North Sea.

Cruiser-
battle-
ships.

The following particulars of the trials of the Indomitable class have been published in *Engineering* :—

Name of Ship.	Makers of Machinery.	Type of Boiler.	First Thirty Hours' Trial.		Second Thirty Hours' Trial.		Eight Hours' Full Power.	
			I.H.P.	Coal per I.H.P. per Hour.	I.H.P.	Coal per I.H.P. per Hour.	I.H.P.	Coal per I.H.P. per Hour.
Indomitable ...	Fairfield Engineering Co. Turbines	Babcock & Wilcox	8480	2·6	29,300	1·6	43,700	1·2
Inflexible ...	J. Brown & Co. Ltd. Turbines.	Yarrow	9130	2·3	31,400	1·8	43,300	1·7
Invincible ...	Humphreys, Tennant, Ltd. Turbines.	Yarrow	9300	2·3	31,500	1·6	44,800	1·5

The designed speed of this class is 25 knots, which on trial they are reported to have considerably exceeded. The Indomitable was commissioned on June 25, 1908, and carried the Prince of Wales to attend the celebration at Quebec at the end of July. On the return voyage across the Atlantic she attained an average speed of 25·13

knots from Belleisle to the Fastnet. The Inflexible was commissioned on October 20, 1908, and has made a voyage to the Mediterranean. The Invincible will be in commission before this work is published.

The main armament consists of eight 12-in. guns mounted in pairs in barbette turrets, one of which is on the centre line forward and the other on the centre line aft, the other two amidships in échelon. All eight guns can be fired on either broadside, six either ahead or astern. The anti-torpedo-boat armament comprises sixteen 4-in. Q.F. The protection is given by a Krupp steel belt, 7 in. thick amidships, tapering to 4 in. at bow and stern.

The Indefatigable was laid down at Devonport in February. The following are believed to be her principal particulars as compared with those of the Indomitable :—

			Indomitable.	Indefatigable.
Length	...	...	530 ft.	570 ft.
Beam	...	...	78 ft. 6 in.	79 to 80 ft.
Displacement	...	...	17,250 tons	18,000 tons
Horse-power	...	...	41,000	45,000
Speed	...	...	25 knots	28 knots

The armoured cruiser Defence went through her official steam trials in November. She was laid down in February, 1905, and will have been nearly four years under construction by the time she is commissioned. On the full-power eight-hour trial, 27,570 I.H.P. was developed, and it is assumed from the performances of her sister-ships that the designed speed of 23 knots was exceeded. On the thirty hours' trial at four-fifths power an average speed of 20·9 knots was obtained with 19,500 I.H.P. The Defence was commissioned on February 7, 1909.

The Boadicea was launched on May 14 at Pembroke. Displacement, 3300 tons; length between perpendiculars, 385 ft.; beam, 41 ft.; draught, 13 ft. 6 in.; I.H.P., 18,000; speed, 25 knots; armament, six 4-in. guns. Another third-class cruiser, named the Bellona, of a similar type, was laid down at Pembroke on June 5, 1908, and launched on March 20th, 1909. Displacement, 3360 tons.

The cruisers recently laid down are considerably larger than the Boadicea, and are described as second-class cruisers. Contracts have been placed for the Bristol with Messrs. John Brown & Co., for the Glasgow with the Fairfield Co., for the Liverpool with Messrs. Vickers, for the Gloucester with Messrs. Beardmore, and for the Newcastle with Messrs. Armstrong. Displacement, 4800 tons; length, 430 ft.; beam, 47 ft.; mean draught, 15½ ft.; I.H.P., 22,000; speed, 25 knots. They are said to have a heavy armoured deck, and the guns to be mounted in armoured casemates. They will be driven

by turbine engines of the Parsons type.* The machinery will be made by the builders except in the case of the Newcastle, the engines for which will be supplied by the Wallsend Engineering Company.

The cruiser-battleships at present building for our own and foreign Navies are too large and costly to be distributed about the world for the protection of commerce, and there was much force in the concluding observations of a leading article on the subject in the *Times*:—

The more cruisers we build that are fit to lie in a line, the more essential it is that our ships which are cruisers and nothing else should be maintained at a strength sufficient to secure that effective and dispersive command of the sea, which it is their special function to establish and maintain inviolate.

Having regard to the First Lord's statement that the Bristol class will possess good sea-keeping qualities, the cruisers already laid down in 1909 and provided in the programme of 1909–10 may satisfy the above requirement.

Swift.

The special destroyer Swift is understood to have attained a speed of 35·5 knots during a preliminary trial. Great secrecy has been observed as to the results. Displacement, 1825 tons; I.H.P., 30,000.; designed speed, 36 knots. The Swift is fitted with turbine machinery and burns only oil fuel.

De-
stroyers.

The delivery of two of the destroyers of the Tribal class was delayed by the engineering strike. Particulars of their trials were given last year, the Tartar establishing a record with a speed of 35·67 knots, which, as far as is known, has not yet been surpassed by the Swift. Two destroyers, the Amazon and Saracen, were laid down in 1907, and both have been launched. The Amazon on her official trial attained a speed of 33½ knots. Five destroyers were laid down in 1908. These seven destroyers have a displacement of from 950–1000 tons, or about 100 tons more than their predecessors. They carry an armament of two 4-in. guns instead of three 12-prs. Two destroyers, the Albacore and Bonetta, are to be purchased from Messrs. Palmer to replace the Tiger and Gala.

The sixteen destroyers of the 1908–9 programme are all under construction, viz., three each by Messrs. John Brown & Co., Limited; the Fairfield Shipbuilding and Engineering Company, Limited; and Messrs. Cammell, Laird, & Co., Limited; two by Messrs. J. S. White & Co., of Cowes; and one each by Messrs. William Denny and Brothers, Dumbarton; Messrs. R. & W. Hawthorn Leslie & Co., Limited, of Newcastle-on-Tyne; the London and Glasgow Company, Limited, Glasgow; the Thames Ironworks and Shipbuilding Company, Limited, and Messrs. J. I. Thornycroft & Co., Limited, Southampton. These destroyers are to cost £100,000 to £120,000 a-piece. They

* The Gloucester has Curtis turbines.

are driven by turbine engines, but will burn coal instead of oil fuel. The designed speed has been reduced from 33 to 27 knots, a very large difference; as to which the following observations from *Engineering* are worth quoting at length :—

At first sight this seems a change of serious import, but it is not possible to form a definite opinion regarding the speed without full knowledge, and when this is available it will probably be admitted, even by the critics, that in service in a seaway the new vessels will prove faster than the old. It should be remembered that, after experience with the light 30-knot destroyers built five years ago, the Admiralty introduced what was known as the River class, giving them a speed of 25 to 25½ knots. These vessels, launched in 1903 to 1905, were of stronger build with a high forecastle, and were more heavily armed. They are thus able to continue in a seaway at a higher rate of speed than was possible, under the same weather conditions, with the earlier boats of from 300 to 400 tons displacement. The displacement was increased by quite 60 per cent., and almost the whole of this was absorbed by the hull, the machinery only taking a small proportion of the addition. The advent of the turbine suggested a still further advance in speed—to 33 knots; and there can be no question that these vessels, belonging to the Tribal class, have done remarkably well. The actual speeds attained on trial ranged from 33½ to about 37 knots. This was in consequence of the adoption of oil-fuel as well as of highly-efficient steam-turbines. The hull, however, suffered in some measure, a fact which will be better appreciated when the relation of power to total displacement be taken into consideration. In the early 30-knot vessels the power equalled 16 indicated horse-power per ton displacement. In the River class this was reduced to about 12 horse-power; in the 33-knot class it rose to 18 horse-power per ton, whereas in these new vessels there will be a reversion to near the ratio existing in the River class.

Without entering into any question of the strategical and tactical advantage of speed, particularly in these vessels, it must be accepted that speed in a seaway is at least as important as the maximum speed in smooth weather. This involves some consideration of the function of the destroyer; if the vessel is merely to destroy torpedo-boats, then the weather conditions assumed in design need not be any more unfavourable than that provided for by torpedo-boats. There is, however, a tacit understanding that the destroyer will be used in certain circumstances for scouting duty, or for despatch work, when the maintenance of a high speed under adverse sea conditions will be of enormous advantage. It would seem, therefore, that what ought to be aimed at in these craft as well as in all warships, is a thoroughly reliable normal speed, with provision for moderately safe overloading of the machinery in extreme emergency. Fortunately the steam-turbine admits of a far higher degree of overloading than the piston-engine, and without forfeiting any measure of steam efficiency. That being so, the design of torpedo-boat destroyers should be so conceived as to give satisfactory normal speed, with mechanical facilities to deal with abnormal overloads, even if they involve risks.

All the torpedo boats of the 1906-7 programme, twelve in number, Nos. 13 to 24, have been completed. Of those of the 1907-8 programme, eight have been launched as follows:—Nos. 25, 26, 27 and 28 at East Cowes, on July 28th, August 29th, September 29th and October 29th respectively; Nos. 29 and 30 at Dumbarton, on August 29th and September 24th; Nos. 31 and 32 at Woolston, on October 10th and November 23rd. The four remaining vessels of this batch, Nos. 33-36, are still on the stocks, two at Hebburn and two at Jarrow. No boats have since been laid down.

Eight submarines of the C Class have been completed and commissioned, bringing the number of boats of this type now in service up to sixteen. Four more of the same class are in hand at Chatham Dockyard, two of which (C 17 and C 18) were launched on August 13th and October 10th. Ten of the submarines under construction at Barrow are also of the C type, being numbers 21 to

Speed
of de-
stroyers.

Torpedo
boats.

Sub-
marines.

30, of which Nos. 21 to 24 have been launched, the last named being the fiftieth submarine to be put afloat for the British Navy. The D 1 was also put afloat in 1908, and there are four boats of this class on the stocks.

Disasters.

On April 25 the second-class cruiser *Gladiator* was beached after collision with the American liner *St. Paul* off Yarmouth. Twenty-eight lives were lost. After much difficulty she was raised and towed to Portsmouth, where she is to be sold. It is more than doubtful if the price which will be realised will cover the cost of salvage.

On April 2 the *Tiger* was cut in two by the *Berwick* during night operations off St. Catherine's Point. Twenty-two of the crew were saved, twenty-eight were lost. On April 27 the destroyer *Gala* was cut in two by the *Attentive*, also during night manœuvres with lights out. In this case all the crew were saved except Engineer-Lieut. Fletcher.

Obsolete ships.

In addition to a number of hulks, gun-boats, etc., the following old battleships have been sold during the past year:—

Name of Ship	Price realised.	When built.	Original cost.
	£		£
<i>Devastation</i>	21,700	1873	430,746
<i>Alexandra</i>	21,750	1876	653,915
<i>Colossus</i>	18,500	1885	781,537

The following battleships are to be sold: *Thunderer*, *Edinburgh*, *Anson*, *Howe*, *Rodney*, and *Benbow*. The practice of selling obsolete ships has been extensively copied in the French Navy.

Rosyth.

Particulars of the works proposed at Rosyth were given last year. The contract has been let to Messrs. Easton Gibb & Son, the main works to be completed in seven years, and those for the torpedo flotilla and submarines in 4½ years, with a substantial bonus for earlier completion.

Gunnery.

It will be noted from reference to the tables of Gunlayers' Tests, which are printed in Part IV., that there has been a further considerable improvement in gunnery during the past year.

	Hits per Minute.		
	1907.	1908.	Difference.
12-in B.L.	0·81	1·11	+0·29
9·2-in. Mark X	2·04	2·37	+0·32
7·5-in. B.L.	1·57	2·50	+0·92
6-in. B.L. Mark XI	4·20	4·08	-0·12
6-in. B.L. Mark VII and VIII	3·42	4·08	+0·60
6-in. Q.F.	3·02	3·86	+0·84
4·7-in. Q.F.	2·54	3·50	+0·95

It will be seen from the above that with only one type of gun has there been any falling off (and that to a very slight extent) as compared with the previous year. With four types of guns there has been a very marked improvement, equivalent in some cases to an additional hit per gun per minute.

In Battle Practice the Home Fleet was easily first, the China Squadron being second. The best scores were made by the Indomitable and Cochrane with 562 and 547 points respectively, or nearly 100 points more than the next best ships.

A coaling record was established by the battleship King Edward on March 2nd. By means of an electrically-driven Temperley transporter 1451 tons of coal were taken on board in $3\frac{1}{2}$ hours, or an average of 414 tons an hour. Coaling record.

The naval manœuvres in the North Sea, under the direction of Lord Charles Beresford, brought together a very large number of ships from the Atlantic, the Channel, and the Home Fleets. The following ships took part:— Naval manœuvres.

Battleships	29
Armoured cruisers	23
Protected cruisers	23
Scouts	8
Torpedo gunboats	10
Destroyers	112
Destroyer parent ships	6
Submarines	27
Submarine parent ships.	3
Mine layers	3
Torpedo-boats.	62
Repair ships	2
	<hr/>
	313
	<hr/>

The Second Cruiser Squadron, consisting of the Good Hope, Antrim, Devonshire, and Carnarvon, visited South Africa in October last year. The officers and men of the squadron everywhere met with a splendid reception; parties of sailors were even taken as far as Johannesburg and Pretoria. The visit of the squadron coincided with the sittings of the Convention on South African union. The Squadron afterwards proceeded to the S.E. coast of America and visited Montevideo, Buenos Ayres and Rio Janeiro. The welcome accorded to the British ships was of a marked character. Visit of the First Cruiser Squadron to South Africa.

The voyage of the Pelorus to Iquitos, over 2000 miles up the Amazon, is worthy of note.

The shipbuilding industry has passed through one of the worst years ever known. The percentage of unemployed in the unions of workmen engaged in the industry amounts to nearly 22 per cent. An interesting table was published in the *Naval and Military Record* showing the number of ships under construction during the last ten years. In 1901 there were thirty-six, and in 1902 thirty-seven Ship-building industry.

armoured ships under construction, in 1908 only twelve. The tonnage of armoured ships under construction in 1908 was less than half what it was in 1901-2. This is due partly to reduced programme of armoured ships and to the fact that Japan is now constructing all her own warships in Japan.

**Estimates
1909-10.**

The Estimates of 1909-10 amount to £35,142,700, an increase of £2,823,200 on the Estimates for 1908-9. Roughly two-thirds of this increase is under the votes for shipbuilding and armaments. There is an increase of over £600,000 in the vote for Naval works, and though the numbers of the *personnel* remain the same, there are substantial increases in the votes for wages, victualling and clothing, and the non-effective votes. Explanations for these increases are given in the First Lord's Statement.*

Personnel.

The numbers of the *personnel* stand at 128,000, the figure of the past two years. There is a decrease of nearly 300 men in the Coast-guard and of over 700 men in the Marines, these decreases being compensated for by an increase in the number of petty officers and seamen and service boys. There are to be over 200 more boys under training than in the previous years, making an increase of over 600 boys in the last two years, which appears to indicate an increase in the permanent force in the near future. The Reserves of all classes number 57,686, an increase of 320 men as compared with 1908-9. In the Royal Naval Reserve there is a decrease of 105 officers and 1375 men, making a reduction of about 5000 officers and men in this force during the last two years. Of the Fleet Reserves, Class A (Pensioners) shows a small reduction, while there is an increase of 1500 men under Class B (Non-Pensioners). It is noteworthy that the numbers borne in the Fleet Reserve on January 1, 1909, were considerably below the establishment. There is an increase of 300 in the Naval Volunteer Reserves, and the numbers borne on January 1 were in excess of the establishment. The total number of our Reserves cannot be considered satisfactory.

New construction.

The votes for new construction, as was generally expected, show a substantial increase. The agitation for a large programme of battleship construction has been vigorous. Four battleships are to be laid down in 1909-10, and preparations may be made by the Admiralty, should they think it advisable, for laying down four more at the beginning of the next financial year. Two battleships are to be built in the dockyards, and two by contract. On the latter over £500,000 apiece will be spent during the financial year 1909-10, and on the former about half this sum. Two are to be laid down in July, and two in November, so that all four should be completed by the end of 1911.

* See Part IV.

The programme also includes four protected cruisers, of the Bristol type and two of the Bellona type, which are badly needed to take the place of the Naval Defence Act and other cruisers (which have been so rapidly "scrapped") in the protection of our world-wide commerce, twenty destroyers, and the expenditure of £500,000 on submarines.

The battleship programme is not sufficient to maintain our present position as regards capital ships (though this question is examined at greater length in Chapter III), and it would have been far more satisfactory if a large proportion of the sum to be devoted to submarines and some of that to be spent on destroyers were diverted to the laying down of two more battleships.

The present deplorable position of the French Navy amongst the navies of the world is in no small measure due to the large proportion of naval expenditure that has been diverted in recent years from capital ships to subsidiary purposes, torpedo boats, submarines, and the like. Let us take warning from France. In present circumstances, and with the heavy commitments for Old Age Pensions and other purposes which the Chancellor of the Exchequer has to meet, a larger increase than that proposed by the Government could hardly have been expected in the Navy Estimates. It is in view of these considerations that the suggestion to divert money from submarines and destroyers to capital ships is made.

THE COLONIES AND THE NAVY.

The large additional burdens thrown on the British tax-payer for various purposes during the past year strengthen the conviction already expressed in these pages that the resources of the United Kingdom are insufficient for the maintenance of a Navy up to the two-Power standard. The command of the sea, which is absolutely vital to the safety of our scattered dominions and world-wide trade, cannot for much longer be secure unless the resources of the whole Empire are drawn upon for the common defence. As a general principle of Imperial defence it may be laid down that, while the military forces of the various self-governing Dominions or Colonies should remain under the control of their respective Governments, the naval defence of the Empire must be provided for by a Navy under one control.

This principle is fully accepted in the South African Colonies and in the Dominion of New Zealand. In announcing to the Governor on March 16, 1908, the increase of the Dominion's subsidy

Principles
of Im-
perial
Defence.

Colonial
opinion :
New
Zealand.

to the Australian-New Zealand Squadron, from £40,000 to £100,000, the Prime Minister made the following statement:—

Recognising how important it is for the protection of the Empire that the Navy should be at the absolute disposal of the Admiralty, Your Excellency's Advisers do not desire to suggest any conditions as to the location of the ships, as they are confident that the truest interests of the people of New Zealand will be best served by having a powerful Navy under the independent control of those responsible for directing it in time of peace or war. What the Government does feel concerned in is that the Navy, in whatever part of the world it may be, should be under one control, so that the most effective results for the defence of all portions of the Empire may be assured.

Canadian opinion.

In Australia, during the first years after the establishment of the Commonwealth when Sir John Forrest was Minister of Defence, a similar view prevailed. In Canada there has not hitherto been shown any serious disposition to contribute to the general naval defence of the Empire, though Canada has relieved the Imperial Government of the cost of maintaining and garrisoning the naval stations of Halifax and Esquimalt, and from time to time suggestions have been put forward for constructing in Canada a Canadian Navy. The Canadian correspondent of the *Times* in an article which appeared on January 16th, points out that there has been recently an awakening of the public conscience in Canada on this subject. He gives two quotations from leading Canadian newspapers. The first, from the *Montreal Gazette*, reads as follows:—

If the comments of newspapers throughout the country are an indication, a proposition that Canada should bear a share of the cost of the naval defence of the Empire would meet with as little effective opposition as did the resolution to send Canadian soldiers to South Africa when they seemed to be needed there. The call of that which looks like duty has its legitimate influence with Canadians.

The second is from the *Ottawa Journal*, and is as follows:—

Canadian cash for the British Navy and a voice in the Imperial naval councils. Who says that the Canadian people are not willing to bear their share of the Imperial naval burden? That question should be put specifically to the test.

Colonial contributions.

Last year India contributed £100,000 to the maintenance of H.M. ships in Indian waters. The Australian Commonwealth contributed £200,000 and the Dominion of New Zealand £40,000 to the maintenance of the Australasian Squadron and the establishment of a branch of the Royal Naval Reserve. Cape Colony contributed £50,000, and Natal £35,000 to the general maintenance of the Navy, and Newfoundland £3000 to the maintenance of a branch of the Royal Naval Reserve. With the increase of the subsidy from New Zealand, the total contribution from the outlying portions of the Empire to the maintenance of the Imperial Navy would have been raised to, in round figures, £500,000—not a very substantial contribution to estimates amounting to over £35,000,000.

In Australia, the views which prevailed when Sir John Forrest Australia. was Minister have been abandoned, and during the past year a correspondence has been proceeding between the Commonwealth Government and the Home authorities, with regard to the establishment of a naval force in Australia under the control of the Commonwealth Government. The chief features of the scheme were the creation of a force of six destroyers and nine submarines, together with two depôt-ships, manned by 97 officers and 1125 men, part of whom, at any rate, would be recruited from Australia. The total annual charge to the Commonwealth was estimated at £346,000, a considerable increase on the contribution at present made. The proposal just described was on the part of the Admiralty a concession to a large section of Australian opinion, and in view of the somewhat misleading statement of Lord Granard in the House of Lords on the subject, the opinion of the Admiralty is given below :—

My Lords consider that the security from over-sea attack of the Empire generally, of which the Australian Continent forms an important part, is best secured by the operation of the Imperial Navy, distributed as the strategic necessities of the moment dictate. At the same time they recognise that under certain contingencies, the establishment of a local flotilla acting in conjunction with the Imperial forces would greatly assist in the operations of the latter. My Lords also recognise the importance, politically, of fostering a feeling of security among the inhabitants of the coast towns of the Commonwealth by the provision of a local force which will always be at hand. In the absence, therefore, of any direct contribution to the expenses of the Imperial Navy, my Lords will be ready to co-operate in the formation of such a flotilla, subject to a satisfactory understanding being arrived at in regard to the general administration of the force.

Owing to a change of Government the above scheme has been dropped, and the Commonwealth Government now proposes to construct an "Australian Navy" by building two or three destroyers.* Changes of policy. Submarines might probably prove deterrent to any ship that might wish to enter Port Phillip or Sydney Harbour, but destroyers do not seem a very useful type for service in Australia. The force now proposed presents this advantage from the Australian point of view, that it cannot, like the cruisers previously maintained in the Australian Squadron, be moved from Australian waters. The question as to the control of the force in time of war is therefore very unlikely to arise.

Before confederation each of the older colonies—New South Wales, Criticisms upon. Victoria, South Australia and Queensland—maintained its own little Naval force. The Victorian Navy, for instance, included the Coast Defence ship Cerberus and several gunboats. It came to be felt that the money spent on the maintenance of these more or less useless ships was to a great extent wasted, and the Colonial Navies were

* Contracts for two destroyers placed with Messrs. Denny and the Fairfield Company.

abolished. The only real return for the money spent was the training which a certain number of men received under an energetic naval commandant like Captain Creswell (now the Naval adviser to the Commonwealth), but this object was far better secured under the agreement of 1902. The policy of the present Commonwealth Government is a retrograde step, and is simply a return to a policy which had been tried and found wanting. As pointed out in the *Naval Annual* of 1907, it would be better for the Commonwealth to devote an extra sum to increasing the efficiency of her military forces than to spend the same money on the creation of a naval force which is too small to be efficient or effective.

In a Memorandum submitted to the Colonial Conference of 1902 Sir John Forrest, speaking of the part the Colonies should play in the naval defence of the Empire, said: "Their aim and object should be to make the Royal Navy the Empire's Navy, supported by the whole of the self-governing portions of the Empire and not solely supported by the people of the British Isles." This is the ideal which is not realisable under our present system of Imperial Government. The position which Canada has taken up is a strong one. "If you want us to help, you must call us to your Councils." Until some method is provided for giving the representatives of the Dominions beyond the seas a voice in the direction of Imperial policy, no substantial contribution to the general defence of the Empire can be expected or demanded.

In view of the now evident intention of Germany to contest at no distant date our command of the sea, and the aggressive action of Austria in the Balkan Peninsula—the outcome of which may be a closer union of German-Austria with Germany, giving Germany an outlet to the Mediterranean, and thus seriously complicating our naval position—an Imperial Conference should be summoned at once to consider whether it is not possible to combine the resources of the whole Empire in the common defence, and to devise some means of giving the colonies a voice in the direction of Imperial policy. The opinions expressed in the Canadian and Australasian press since the debates on the Navy Estimates make it probable that such a conference could be held with great advantage.*

* Since these pages were in print the New Zealand Government has offered to bear the cost of building one or, if necessary, two battleships for the Royal Navy. The offer has been accepted. Pressure is being brought to bear by public meetings and in other ways to induce the Canadian and Australian Governments to make a similar offer.

CHAPTER II.

FOREIGN NAVIES.

FRANCE.

For the French Navy the year 1908 was one of very remarkable character. It was marred by the occurrence of terrible gunnery accidents; it saw the practical abandonment of certain schemes for the better training of the *personnel*; a Minister who had been greatly trusted, and who, in face of enormous difficulties, had accomplished much, and planned a great deal more, was driven into retirement; and at its close one of the most experienced of French Admirals, an officer whose capacity and value were well known, was removed from his command because he had communicated to the public certain dangerous wants of the naval organisation with which it was high time they should be made acquainted.

The resignation of M. Thomson, who had held the Naval portfolio for nearly four years, was brought about by the hostility of the Chamber, many members of which sought to place upon the shoulders of the Minister responsibility for the successive disastrous explosions in the *Iéna*, the *Couronne*, and the *Latouche-Tréville*. M. Thomson contended that, if there had been negligence, it went back much before his time, and said that in view of the loss of confidence in him there was no choice but for him to resign.

M. Thomson's
resignation.

His successor, M. Alfred Picard, is a scientist and engineer, who has had much experience in public offices and appointments, having been the organiser of the International Exhibition of 1889 and Commissioner-General of that of 1900. His reports on these exhibitions were regarded as masterpieces. As Minister of Marine M. Picard has a task of stupendous difficulty before him. He has to reorganise the whole of the Naval services, to simplify the system of administration, and to decentralise it, and to prepare a plan for the reconstitution of the Fleet.

M. Picard.

The case of Admiral Germinet indicates the state into which the French Navy has been allowed to fall. The Admiral, in the course of a conversation with a representative of a local journal at Toulon, had said that the stock of ammunition for the Fleet was insufficient, and that his official representations of the fact had remained un-

Admiral Germinet.

answered or had produced no result. Upon this he was summoned to Paris to explain his assumed indiscretion, and he had interviews with M. Picard and M. Clemenceau. The latter said that, while fully recognising the professional qualities of Admiral Germinet, he could not but see that he had committed a fault in communicating with the press. The Council of Ministers approved M. Clemenceau's views at its sitting on December 5th, with the result that the Admiral was relieved of his command of the Mediterranean Squadron. The general opinion upon this episode was that the services of one of the most valuable of French officers* had been lost, at least temporarily, to the Navy, and that the Government, and not the Admiral, was really culpable in the matter. Admiral Germinet has been succeeded in the command by Admiral Fauque de Jonquière.

The
Report
of the
Budget
Com-
mittee.

M. Chaumet, who was again the reporter of the Committee on the Navy Estimates, takes as gloomy a view of the progress of new construction in France as he did last year. He devotes the first section of his report to an examination of the actual naval force of France, and after eliminating vessels of different classes which are unfit for further service, estimates the effective strength of the French Navy as follows: Battleships, 15; coast defence ships, 5; armoured cruisers, 21; destroyers, 64; torpedo-boats, 162; submersibles, 30; submarines, 38. Of the above, he points out that the coast-defence ships, torpedo boats, submersibles and submarines are only of service for defence, and cannot be utilised for offensive operations.

Causes of
Naval de-
cadence.

Why, he asks, in the third section of his report, has France lost the second place which she so long occupied amongst the navies of the world, in spite of the fact that for many years the Navy Estimates exceeded those of any other Power except Great Britain?

"C'est, dit-on, que nous n'avons pas de politique navale. Nous croirions plutôt que c'est parce que nous en avons eu une, beaucoup plus obstinément suivie, qu'on ne le croit communément, mais qui était mauvaise. Elle s'inspirait de ces deux idées également fausses:— Qu'il nous fallait une marine défensive; Qu'on pouvait avoir une marine au rabais.

La
Marine
Défensive.

"Sous prétexte que nous ne songions pas à aller attaquer les autres peuples, on prétendait qu'il devait nous suffire, pour défendre notre littoral, de gros canons placés sur des navires qui n'avaient point besoin d'un rayon d'action étendu (nos garde-côtes). On comptait aussi sur des multitudes de torpilleurs qu'on jugeait d'autant plus

* The great improvement which Admiral Germinet had effected in the training and discipline of the Mediterranean Squadron was described in the *Times* of August 20th, 1908.

redoutables qu'ils étaient moins visibles, c'est-à-dire plus petits. On se flattait, enfin, de porter à l'adversaire des coups ruineux, en lachant sur les navires de commerce ennemis, comme autant d'oiseaux de proie, nos croiseurs rapides. Conception séduisante, mais qui ne résiste guère à l'épreuve de l'expérience !

“La défensive obligée, c'est la défaite assurée. On laisse, en effet, à l'ennemi le choix de l'heure et du lieu du combat. Il ne risque la bataille que certain de sa supériorité. Pour se défendre efficacement, il faut pouvoir attaquer dans des circonstances choisies.”

M. Le Bail, in the debate in the Chamber of Deputies, summarised the causes of the deplorable condition of the French Navy as follows :— Opinions
in the
Chamber.

1. We conceive a Navy as a force destined for the defence of territory, while abroad the object is the destruction of the enemy's Naval force.
2. While we have the inventive spirit, we fail as regards continuity of effort in method and in practical sense.
3. The want of subordination of the technical and administrative branches to the fighting Navy.
4. The hindrances to the training of staff and crews imposed by complicated administrative and financial regulations.

M. Benazet said that the situation was due to the fact that France had made her Naval policy rest on a manifestly absurd principle, namely, that of inert defence of the coast-line.

M. Picard, in the same debate, admitted that the composition of the French Fleet was not what it should be for a great Naval Power, and concurred with M. Le Bail, Admiral Bienaimé, and other speakers that the essential object of Naval war should be the destruction of the Naval force of the enemy, and with M. Chaumet's appreciation of the situation. He announced that a programme of new construction would shortly be submitted.

The opinions expressed by M. Chaumet in his report were thus strongly supported by various speakers in the Chamber of Deputies. It has long been recognised in this country that a Naval policy based on the ideas of Admiral Aube and the *Guerre de Course* was a fatal one. The *Guerre de Course* might cause considerable losses and inconvenience to the enemy, but could have no serious influence on the result of a Naval War. The French Navy has fallen from its former great position amongst the navies of the world because too large a proportion of French Naval expenditure has been devoted to secondary objects, such as torpedo-boat construction. It is a good omen for the future of the French Navy that the causes of de-

cadence are recognised by the official head of the French Admiralty, as well as by the best opinion in Parliament.

Alterna-
tive pro-
grammes.

The French Admiralty has been considering what the Estimates would amount to on the hypotheses of a Navy including, in 1919 or 1920, twenty-two or twenty-eight or thirty-eight battleships. For twenty-two battleships the Navy Estimates would amount to from 317 to 355 millions of francs. For twenty-eight battleships the figures would be from 356 to 398 millions of francs, while on the hypothesis of thirty-eight battleships the Navy Estimates must be increased to from 422 to 465 millions of francs, or, say, rather over £18,000,000 sterling—an increase of, roughly, £6,000,000 on the Estimates of recent years. The German Navy Estimates for a programme of thirty-eight battleships, it may be noted, already amount for 1909 to over £20,000,000 sterling, will rise to £23,000,000 sterling in 1911, and will not fall below the figure of 1909 during the years covered by the programme.

Addi-
tional
expendi-
ture.

M. Picard presented a demand for an outlay approaching £9,000,000, to be spread over six years, for the improvement of the ports, the construction of docks, the supplying of the dockyards with new machinery, the provision of ammunition and war stores, and other matters, many of which he declared to be urgent. The Minister of Finance, who has had great difficulty in producing equilibrium in this year's budget, refused to admit this urgency. But the Cabinet, recognising that public opinion was with M. Picard, intervened, and a compromise was effected by which M. Picard reduced his demands from £9,000,000 to £7,600,000, which will be spread over six or seven years. A Parliamentary Committee has been appointed to inquire into the state of the French Navy.

Progress :
Battle-
ships.

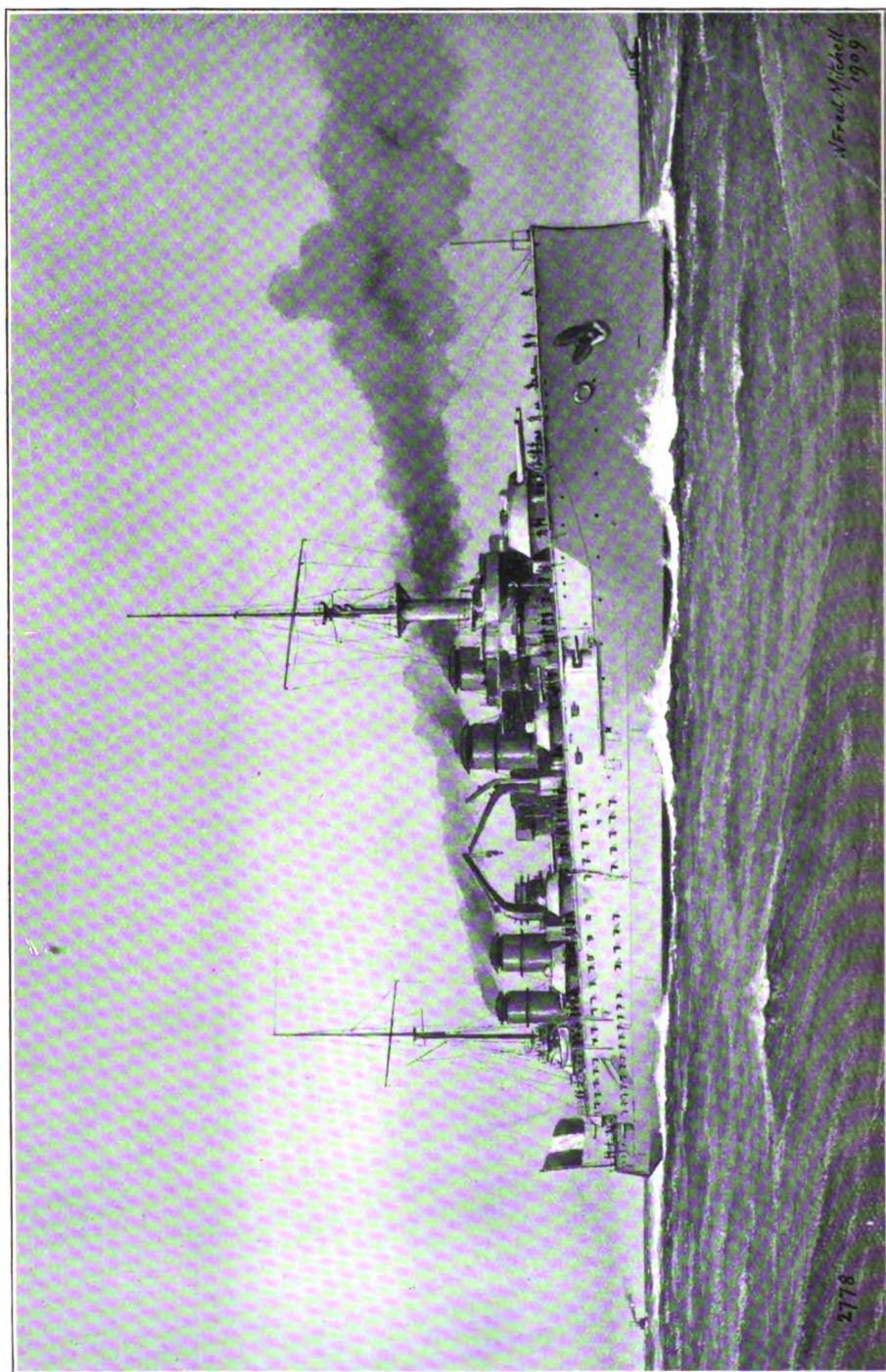
All the ships of the Patrie class have now been completed. The *Verité*, the last to be commissioned, has been added to the Mediterranean Squadron. Particulars of the trials of these ships were given last year. They attained a speed on trial of about $19\frac{1}{4}$ knots. Their continuous sea-speed has been proved by tests extending for three days to be from 17 to $17\frac{1}{2}$ knots.

Of the battleships of the Danton Class (displacement 17,710 tons), which were laid down in 1906 and 1907, the *Voltaire* was launched at La Seyne on January 21st, 1909. The Danton and *Mirabeau* should be completed, according to the programme, in 1910; the *Vergniaud*, *Voltaire*, *Diderot* and *Condorcet* in 1911. It is said that owing to the repeated changes in the original plans and consequent slowness of construction each ship will cost nearly £2,400,000 by the time they are completed.

Armoured
cruisers.

The armoured cruiser *Ernest Renan* has been through her trials. Her displacement is 13,427 tons, and the estimated speed 23·5 knots,

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FRENCH ARMoured CRUISER "JULES MICHELET."

with 36,000 horse-power. On a preliminary trial she attained a speed of 21·3 knots, with 22,560 I.H.P. On a further trial she attained a speed for five hours of 24·24 knots, with 37,780 I.H.P.

The Jules Michelet (displacement 12,370 tons) attained a speed of 23·2 knots, with 27,700 I.H.P., on her full-power trials, and is in commission in the Mediterranean Squadron.

The destroyers completed include the Chasseur, Spahi, Fanfare, Sape, Gabion, Carabinier, Sabretache, Oriflamme, Carquois, Pierrier, Étendard, Fanion, and Cognée. The Cavalier, Fantassin, Hussard, Lansquenet, Mameluck, Voltigeur and Tirailleur are to be completed in 1909. These are 28-knot boats. Destroy-
ers.

The following destroyers of 715 tons displacement and 31 knots speed have been ordered :—Bouclier, from Normand ; Casque, from the Forges et Chantiers at Havre ; Fourche and Faulx, from the yard of De la Brosse and Fouché, at St. Nazaire ; Boutefeu, from Dyle and Bacalan at Bordeaux ; Dague and Cimeterre from the Chantiers de la Gironde. The Bouclier and Casque are to be fitted with Parsons, the Fourche and Faulx with Rateau, the Boutefeu with Zoelly, and the Dague and Cimeterre with Breguet turbines. Other destroyers of the class are proposed.

French submarine and submersible boats have been built very slowly. Of the six Emeraudes, submarines, ordered in October, 1903, the first, the Opale, was completed only in May, 1908, and the last, the Turquoise, was launched at Toulon in July. These boats had been under construction for periods varying between four and a half and five and a half years. The submersibles Circé and Calypso, ordered to be put in hand in October, 1904, were barely finished in February, 1908. Of the submersibles of the Pluviôse type, only about one half have been launched, and some of them are not to be completed until 1910, the building periods ranging between three and five years. The sixteen submersibles ordered in 1906, and the ten in 1907, are to be ready in 1910–12. Five other submersibles, Q 100–Q 104, were to be laid down in 1908, but only about £2500 was allotted to them, so that little practical beginning has been made. Six additional are projected for 1909, Q 105–Q 110. French submersible boats built, building and projected, number seventy-four, but not more than about fifteen are ready for service. They vary in surface-displacement from 106 tons in the Sirène to 577 tons in some of the new boats, though the latest planned Laubeuf type will be of not more than about 400 tons. The Pluviôse has a surface speed of 12·3 knots, and a range of 1000 miles at 10 knots, while Q 73, which is to be the biggest of all, built from the plans of M. Hutter, will have a speed of 15 knots, and a range of 2500 miles at 10 knots. Sub-
marines.

The Gymnote, first of French submarines, the Gustave Zédé, and the Narval, first of submersibles, have been removed from the list of the Fleet. In September, the new submarine *Emeraude* underwent an endurance trial in a cruise of 700 miles from Cherbourg to Brest, thence to Dunkirk and back to Cherbourg. The navigation was entirely on the surface, and the Diesel motors worked well and without interruption. The speed was 9 knots. In October, the submersibles *Pluviôse*, *Ventôse*, and *Germinal* were put through the same test at 9 knots, also with success. In 1909, twelve submarines and submersibles are expected to be completed,—two of the *Emeraude* and two of the *Pluviôse* class, Q 73 and 74 (designed by M. Radiguer), Q 75 and 76 (Laubeuf), Q 82 (Bourdelle), Q 83 and 84 (Laubeuf) and Q 89 (Maurice).

The river gunboat *Doudard de Lagrée* was launched in 1908.

Refit.

The *Dupuy de Lôme* has been refitted and given new boilers. The saving in weight has enabled the coal supply to be increased. She steamed at 18 knots after her refit.

M. Ferrand's paper.

The slowness of French Naval construction was the subject of a paper read by M. Ferrand, Ingénieur-en-chef de la Marine, at the meeting of the Association Technique Maritime at Paris in May, 1908. M. Ferrand stated that between the order to build and the actual laying down 5 months elapsed in the case of the *République*, while the interval was 13 months for the *Démocratie*, 26 months for the *Jules Michelet*, 11 months for the *Waldeck-Rousseau*, and 23 months for the *Danton*. In the same way, between the preliminary trials and the actual effective readiness for service, there was an interval of 17 months in the case of the *Charlemagne*, 18 months in that of the *Suffren*, 17 months of the *Gambetta*, and 5 months of the *République*. If the period required to build the Dreadnought were computed on the French system, M. Ferrand says it would be about 24 months, but he does not conceal his admiration of the achievement. The causes of the slowness of construction in France are mainly the insufficiency of the funds made available, and in the Government Dockyards the complicated and centralised system in addition. The private yards could build a battleship in three years if this were desired, but funds are not available and their activity has to be restricted. M. Ferrand's proposal is to include the new construction in a special extraordinary budget, and definitely to order the completion of the vessels by a particular date, so that guns, turrets, armour and machinery might be ordered in sufficient time, instead of the present procedure, under which ships are kept waiting for material.

The private yards are now placed in a position of great difficulty,

and are unable to organise their work, while plans are being discussed, and frequent alterations are being made. There is no proper understanding between the designing and constructing staffs; red-tape is everywhere. There is moreover great delay in the inspection of material and work, and the trials occupy an excessive time.

M. Picard attributes the deficiencies on the establishment—2345 *Personnel.* men on 54,500 in 1906, and 2467 on 54,800 in 1907—to two causes: first, the rapid rise in the complements after 1906, and secondly, the putting in force of the law of 1905, which lowered the period of obligatory service from three to two years.

One of the most deplorable features in the French Navy during the past year has been the number of cases in which attempts have been made, sometimes with success, to do wilful damage by men serving in the Navy or employed in the Dockyards. Two attempts were made on successive days to ruin the engines of the armoured cruiser *Gloire*, on her trial, by introducing pieces of metal into the working parts of the machinery. Other ships have been set on fire, and attempts have been made to burn the workshops in the Dockyard at Toulon. *Incendiaries.*

GERMANY.

The year 1908 was of great importance for the German Navy, because it saw the passing of an amendment to the Navy Law, by which the "life" of battleships was reduced from 25 to 20 years, involving a redistribution of the ships to be built between 1908 and 1917 and an increase in their number. The following is the programme of construction:—

	Battleships.	Armoured Cruisers.	Small Cruisers.	Division of Destroyers.
1909	3	1A	2	2
1910	3	1A	2	2
1911	2 + 1 A	1A	2	2
1912	1	1	2	2
1913	1	1	2	2
1914	1	1	2	2
1915	1	1	2	2
1916	1	1	2	2
1917	1	1	1 + 1 A	2
	15	9	18	18

A = additional ships.

The Marine Rundschau, in taking a survey of the progress of the year, recalls the fact that the amendment of the Navy Law passed its third reading on March 27th, 1908, without debate. It points out

that the necessity of placing the Fleet on a level in offensive and defensive qualities with the fleets of the world was fully recognised, and that the increase of the Navy was the best defence for general peace.

In addition to the increased sums provided in the Estimates for shipbuilding and armaments, the coast defences are being strengthened, the docking facilities on the Elbe are being increased, the works at Wilhelmshaven are approaching completion (making the dockyard one of the largest in the world), the *personnel* is being increased, and additions are being made to pay.

Ship-
building
resources.

A very important feature in German naval progress is the increase in the resources of private establishments for the construction of ships and the provision of guns, armour and machinery. In the *Naval Annual* of last year it was pointed out that German private shipyards could lay down thirteen or fourteen battleships or large cruisers annually, and could probably complete them in an emergency within two years. Their possible output has been increased during the year under review; and Messrs. Krupp are now in a position to supply the armament for eight battleships a year. For this purpose additional capital amounting to £2,500,000 was raised by bankers and others in 1908.

Progress
of con-
struction.
Deutsch-
land class

The last two battleships of the Deutschland class (13,040 tons) have been completed, viz., the Schleswig-Holstein, at Kiel, and the Schlesien, at Danzig, and are in commission in the High Sea Fleet, in place of two of the Kaiser class. The Schlesien was constructed in about 36 months. The Schleswig-Holstein attained a speed of 19·5 knots, and the Schlesien 19·21 knots on their trials, as compared with the 19·16 knots of the Hannover and 19·21 knots of the Pommern.

Nassau
class.

Of the new battleships of the Dreadnought type, the Nassau was launched in March, 1908, at Wilhelmshaven, and the Westfalen (ex Ersatz Sachsen) at the Weser Yard, Bremen, on July 1st, 1908. These two ships are of 17,679 tons displacement. The Nassau, owing to a valve being left open, was sunk at the end of November. She was raised after four days, and no damage was sustained beyond that due to sea-water. This accident, like those in France, may have been due to malicious intent on the part of workmen. Both ships are to be completed in the autumn of 1909. Great activity prevails at Wilhelmshaven, where 8000 men are employed on the Nassau and Ersatz Oldenburg, so that the former will not be delayed in consequence of the mishap.

The Rheinland (ex Ersatz Württemberg) was launched from the Vulcan Yard, Stettin, on September 6th, 1908, and the Posen (ex Ersatz Baden) at the Germania Yard, Kiel, on December 12th, 1908.

The displacement of the Rheinland is said to be 18,307 tons, and the estimated speed 19·5 knots. The armament of all four of the above-named vessels will comprise twelve 11-in. guns and twelve 6·7-in. guns, besides smaller quick-firers. The Rheinland and Posen will probably be completed early in 1910.

The three battleships of the 1908 programme, Ersatz Beowulf, Ersatz Siegfried, and Ersatz Oldenburg, have been laid down respectively at the Weser Yard, Bremen, the Howaldt Yard, Kiel, and the Imperial Yard, Wilhelmshaven. They should be ready for commission by March, 1911.* As a vote of £530,000 is taken for each of the above in the Estimates for 1909, as compared with a vote of £403,000 for the Rheinland and Posen in the Estimates of 1908, it is presumed that the displacement and cost of the later ships will be considerably larger than that of the Rheinland.

1908 Programme.

The armoured cruiser Blücher (ex E) was launched on April 11th, 1908, at the Imperial Dockyard, Kiel. Displacement, 14,760 tons; estimated speed, 23 knots. The armament will probably comprise twelve 8·2-in. guns. The Blücher will be completed in 1909.

Armoured cruisers.

The cruiser-battleship F was launched at the yard of Messrs. Blohm & Voss, Hamburg, on March 20th, 1909, and has been named the Von der Tann. Cruiser G, of the programme of 1908, is also under construction at the same yard. It has been reported that these ships are to displace 18,700 tons and will carry twelve 11-in. guns, as compared with the eight 12-in. guns of our Indomitable class. They will be fitted with turbine machinery, intended to develop 45,000 H.P. The machinery of the Von der Tann will be supplied by Messrs. Blohm & Voss. The cost of the vessel will be £1,833,000, including about £533,000 for gun and torpedo armament.

The Emden (ex Ersatz Pfeil), sister ship to the Dresden, was launched at Danzig on May 26th, 1908. Both these vessels are completed. Displacement, 3544 tons; speed, 24·5 knots. The Kolberg (ex Ersatz Greif) was launched at Schichau's Yard on November 14th, 1908, and the Mainz (ex Ersatz Jagd) on January 23rd, 1909, at the Vulcan Yard, Stettin. Displacement, 4232 tons; speed, 25·5 knots. The Mainz and Kolberg carry an armament of twelve 4-in. guns, instead of the ten 4-in. guns carried by their predecessors. They are to be completed in 1909.

Small cruisers.

The Ersatz Schwalbe and the Ersatz Sperber have been laid down respectively at the Germania Yard and Imperial Dockyard, Kiel. Displacement, 4281 tons. They show a further progressive increase in displacement for the small cruisers of the German Navy from the 2600 tons of the Medusa class which were completed in 1901.

* At latest. They will probably be ready in 1910.

Refits.

The re-fit and transformation of the Kaiser class is in progress. The Kaiser Barbarossa was completed in 1907. The reconstruction of the Kaiser Friedrich III. is in progress, while that of the Kaiser Karl der Grosse, Kaiser Wilhelm II., and Kaiser Wilhelm der Grosse will shortly be taken in hand. The principal alterations are the removal of the four 6-in. guns on the main deck, which could not be fired in a seaway, the suppression of the military masts, the alteration of the funnels, the cutting down of the superstructure, some additions to the side armour, the strengthening of the armoured deck, and the provision of space for larger supplies of ammunition and coal. The second-class cruiser Hertha, as well as the Hansa and Victoria Luise, have been modified on the same lines as the battleships of the Kaiser class, by the cutting down of superstructures and substitution of signal masts for military masts. The Vineta will be taken in hand this year.

Destroy-
ers.

The destroyers of the programme of 1908, of which some have been launched, are in hand :—V 162-164 at the Vulcan Yard, Stettin, S 165-168 at Elbing (Schichau), and G 169-173 at the Germania Yard, Kiel. Displacement, 616 tons. The above will all have turbine engines; the boats building at Stettin of the German General Electricity Company's type; the Elbing boats of the Melms and Pfenninger's type, and the Germania boats of the Parsons type, except G 173, which has Zoelly turbines. Twelve additional destroyers of 670 tons displacement are to be laid down in 1909.

Sub-
marines.

Of submarines and submersibles U 2 was launched at Danzig in 1908, where U 3 and U 4 are in hand. Four others (U 5-U 8) are building at the Germania Yard.

The dockship Vulcan, for docking and salving submarines, built at the Howaldt Yard, Kiel, has been placed in commission. The vessel consists of a double hull, joined together above the water-line at either end, between which a submarine can pass and then be raised out of the water by cranes and tackles.

Navy
Esti-
mates.

The German Estimates for 1909 amount to £20,023,500, or three times the amount of the Navy Estimates of 1899 and 1900. The amount devoted to new construction is £7,074,894, or an increase of £1,478,000 on the estimates of 1908. £489,000 of the above will be spent on the construction of submarines. The armaments vote (guns, torpedoes, and mines) amounts to £3,681,840, an increase of over £900,000 on the estimates for the previous year. The programme of new construction* includes three battleships, Ersatz Frithjof, Ersatz

* With regard to the programme of 1909 Admiral von Tirpitz explained to the Budget Committee that contracts had been placed in anticipation with two private firms for two of the battleships of the year. These contracts appear to have been signed not later than the autumn of 1908.

Hildebrand, and Ersatz Heimdall, a new large cruiser, H, and two small cruisers, Ersatz Buzzard and Ersatz Falke, the first instalments for which are taken in the Estimates. The expenditure on new construction and armaments taken together will be nearly £11,000,000. The estimates for 1909 also comprise the last instalment but one of the vote of £1,650,000 for the dock and harbour works at Wilhelmshaven, which are to make that port a base for eight battleships of the High Sea Fleet. Three docks, each capable of taking a battleship of the largest size, are approaching completion. The vote for the torpedo boat harbour at Heligoland is increased to £225,000, as compared with £100,000 in 1908. A floating dock for ships of the largest size is to be built at Kiel, at a cost of £400,000. New naval barracks are to be built at Wilhelmshaven to accommodate 2400 men, at a cost of £215,000.

The *personnel* of the Navy is to be increased to a total of 53,769, as compared with 50,323 officers and men in 1908. There is an increase of 163 officers and 3283 petty officers and men. The above total of 53,769 is made up as follows:—

Officers	.	.	.	2,631
Warrant Officers	.	.	.	2,308
Petty Officers	.	.	.	10,975
Men	.	.	.	36,205
Boys	.	.	.	1,650
				<hr/>
				53,769
				<hr/>

ITALY.

The most important point to be noted with regard to the Italian Navy is that there are evidences of growing suspicion and rivalry between Italy and Austria, which is likely to lead to a new situation in the Mediterranean. The proposed new Navy Law has not been introduced, owing to an understanding on the subject not having been arrived at. Admiral Mirabello discussed in the Chamber the relative expenditure of the two Powers, with the object of showing that Italy has a distinct preponderance both in expenditure and its results. He pointed out that in the Italian Estimates charges are included for the Mercantile Marine, some capital expenditure, coast defences and signal stations, which do not appear in the Austrian Budget, being in all about £920,000. Charges for pensions must also be deducted, if a true comparative estimate was to be made. If this be done the Italian expenditure in 1908-9 was £5,120,000, and the Austrian in 1908 £2,288,000, giving a ratio of 2 to 1; in 1907 the ratio was 1·6 to 1; in 1909 it will be about 1·9 to 1. A comparison of the

matériel of the Fleet shows a ratio of about 1·5 to 1; and of the *personnel* of 2·1 to 1.

Battle-
ships.

The battleships Napoli and Roma, which have been in hand since 1901-3, have been completed or will be completed during the first six months of the current year. The trials of the Napoli had to be suspended owing to trouble with the engine bearings, but the ship joined the *Divisione Volante* on December 21st, 1908. The Roma is having similar trouble on her trials.

The first vote for the building of the 19,000-ton battleship was passed on the Estimates of 1907-8; but in order to hasten the completion of the long delayed Vittorio Emanuele and the San Giorgio, the battleship was not laid down until the beginning of 1909, and for the same reason the second battleship, the small cruiser S, the docking ship for submarines and a river gunboat have not yet been begun. It has been stated that the new battleship will have an armament of twelve 12-in., eighteen 4·7-in. and sixteen 12-prs.

Armoured
cruisers.

The armoured cruiser Pisa has been completed. Her trial speed was 21·4 knots with natural draught and 23 knots with forced draught. The Amalfi was launched at Odero's Yard, Genoa, on May 5th, 1908; the San Giorgio, at Castellamare, on July 27th, with her propelling machinery in place; and the San Marco on December 20th from the same yard. The Amalfi in her trials at the beginning of March attained a speed of 22·5 knots with 20,800 I.H.P. A full description of these ships was given in the *Naval Annual* of last year. Displacement, 9832 tons; designed speed, 22·5 knots; armament, four 10-in., eight 8-in., and sixteen 3-in. guns.

Destroy-
ers.

Messrs. Ansaldo, Armstrong have completed the four destroyers of the Artigliere type. Displacement, 380 tons; speed, 30 knots; 6000 I.H.P. Four others were provided for in 1907-8. Messrs. Pattison, Naples, have in hand the Calipso and Climene of the 200-ton class.

The submarine Foca was launched at the Fiat San Giorgio Yard, at Muggiano, Spezia. She is designed, like her predecessors of the same class, by Signor Laurenti. Speed on the surface 15 knots.

Esti-
mates.

The Navy Estimates for 1909-10 amount to £6,385,440, as compared with £6,335,880 in the previous year. In both cases the special sum for new construction of £440,000, voted under the law of 1905, is included.

Pro-
gramme.

The programme of new construction, as given in the Estimates, provides for the completion of the battleships Roma and Napoli, for the continuation of the cruiser San Marco and the first-class battleship A, and the scout-cruiser S, for the commencement of the battleship B, and in addition the construction or completion of a distilling ship, two lake gunboats, and other small craft. On the hull and machinery

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ITALIAN ARMoured CRUISER "PISA."

of the battleship A, £440,000 will be spent, and on the armament £37,400. Only £60,000 will be spent on the battleship B, so that little progress will be made upon her during the coming year.

The total sum to be devoted to new construction is £1,386,360, or about £10,000 less than last year. The maintenance of the Fleet, on the other hand, will cost £60,000 more.

The *personnel* of the Italian Navy compares as follows with the *Personnel* previous year :—

—	Officers.	Engineers.	Medical Staff.	Paymasters.	Constructors and Works.	Petty Officers and men.
1908	985	301	227	264	280	27,500
1909	999	320	227	266	287	28,500

Of the men, 21,492 will be serving afloat and 7008 will be serving ashore.

Mention was made last year of the attention devoted to the improvement of gunnery in the Italian Navy. The results of the gunlayers' test in 1908, which took place with ships steaming on a track marked by buoys, at a speed of 14 knots, firing at a target 23 ft. by 56 ft. at a range of 2450 to 2700 metres for heavy and medium calibres, and 10 ft. by 33 ft. at a range of 1250 metres for small guns, were better than in the previous year, 60 per cent. of hits being scored. According to the *Rivista Marittima*, from which these particulars are taken, the prize firing was carried out in two parts. In one, the target was an old torpedo-boat carrying a canvas screen 23 ft. by 82 ft. and towed at a relative speed of 24 knots. The other was carried out at a drifting target at a speed of 14 knots, at a range of 6000 metres. In the former some ships scored 75 per cent. of hits, and in the latter 40 per cent.

At the close of the manœuvres the second division, composed of the armoured-cruisers Garibaldi, Varese, and Ferruccio, at the target used in the first stage of the prize firing for single ships, towed at a speed of 24 knots at a range of 4400 yards, out of 109 rounds, made twenty-one hits on the torpedo-boat's hull and fifty-seven on the canvas, a total of seventy-eight hits, or 71·5 per cent.

JAPAN.

The signature of the Treaty between the United States and Japan, by which each pledges itself to observe the territorial possessions of the other, and, in case of any threatened disturbance, to communicate with the other in order to arrive at a mutual understanding, considerably modifies the Naval situation in the Pacific. The possibility

of a conflict between the United States and Japan appears to have been removed, at any rate for the present. It is stated that the rate of Naval construction has been retarded, and that the so-called *post-bellum* programme will extend over eleven years instead of six. The battleships Satsuma and Aki and the armoured cruisers Kurama and Ibuki will not be pushed forward. The armoured cruiser Ikoma is ready, as well as the scout Yodo.

The Naval Estimates for 1908-9 include 34,810,737 yen (£3,481,073) ordinary expenditure, and 46,138,124 yen (£4,613,812) extraordinary expenditure. Those for 1909-10 amount to £7,490,000, of which £3,673,000 is for ordinary and £3,817,000 for extraordinary expenditure.

The battleship Satsuma, which was launched November 15th, will be completed during the current year. The Aki it is stated will not be ready till 1911. Both ships carry a main armament of four 12-in. and ten 10-in. guns; but while the Satsuma carries twelve 4·7-in. guns and four 12-prs., the Aki will mount eight 6-in. guns and eight 12-prs.

Pro-
gramme.

The programme of new construction includes two battleships, one of which has been commenced at Kure, of 20,800 tons displacement and 20 knots speed. The armament will probably comprise twelve 12-in. guns and ten 6-in. guns. Three armoured cruisers were stated by the Minister of Marine on February 2nd, 1909, to be projected. It has also been reported that two protected cruisers of 4800 tons displacement and 26 knots speed, and four destroyers of 790 tons displacement and 26 knots speed, are included in the programme.

The following particulars have been published as regards the armoured cruisers:—Displacement, 18,650; length, 545 ft.; beam, 80 ft.; draught, 26 ft. 6 in.; I.H.P., 44,000; speed, 25 knots. The maximum thickness of armour will be 7 in. Armament, six 12-in. guns, fourteen 6-in. guns, and ten 4·7-in. guns.

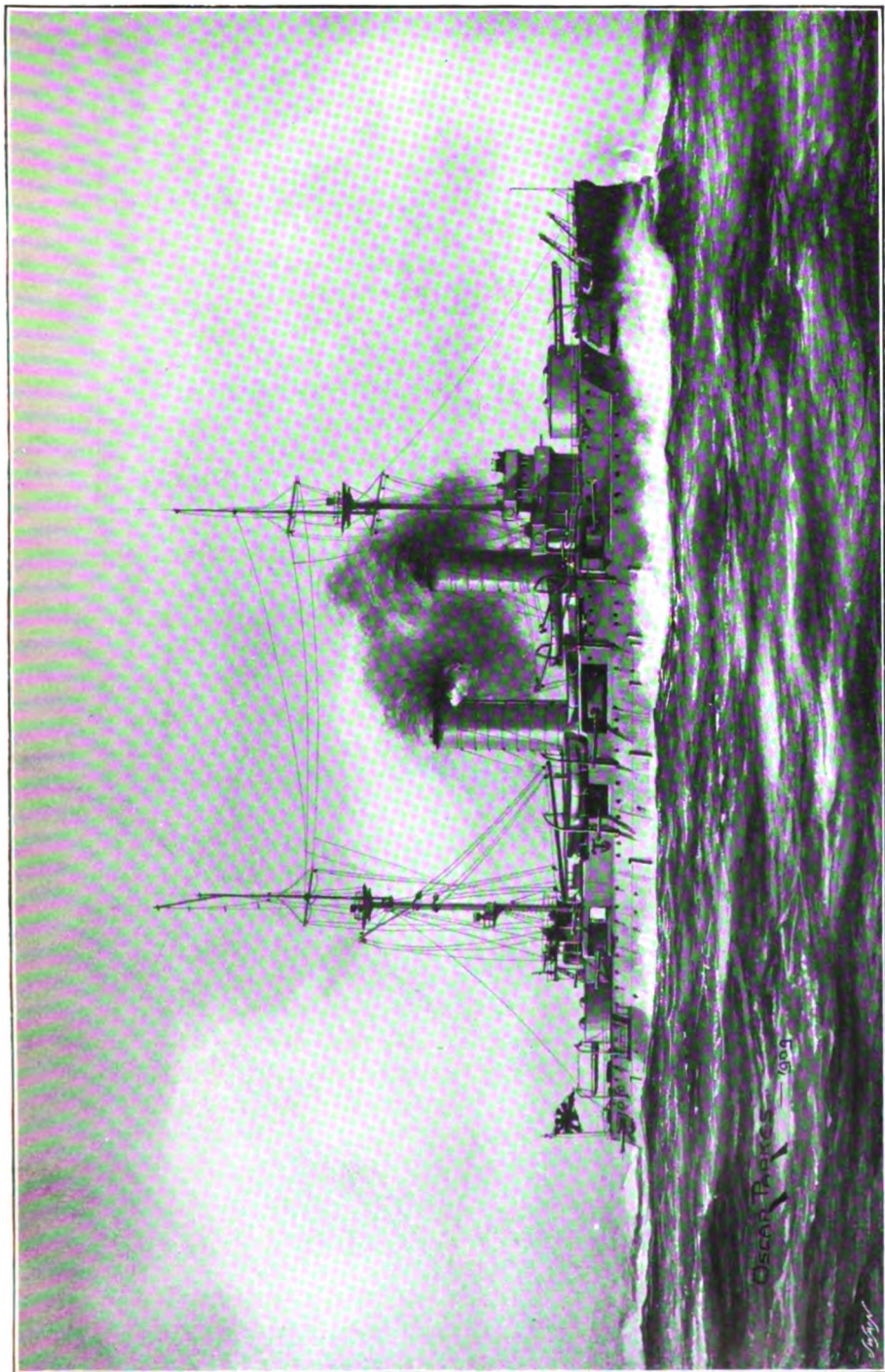
Recon-
struction.

We alluded last year to the reconstruction of the Orel and other ships captured from the Russians during the war. The battleships Sagami and Suo (ex Peresviet and Pobieda) are to be armed with four 12-in. in place of their 10-in. guns. Some of the 6-in. guns (including the bow gun) are to be suppressed. The reconstruction of the Sagami has been completed, as has that of the armoured cruiser Aso (ex Bayan). The Suo (ex Pobieda) and Tango (ex Poltava) are still in hand.

The Sakara Maru, the first merchant cruiser built in Japan, has been completed. Speed, 21 knots.

Dock-
yards.

There are four Imperial Dockyards in Japan, Yokosuka, Kure, Sasebo and Maizuru. At Sasebo, which is situated in the island



JAPANESE BATTLESHIP "IWAMI" (EX "OREL").

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of Kyushu, three new graving docks are under construction, with lengths of 750 ft., 600 ft., and 475 ft. respectively.

The cruiser Matsushima, which was being used for training purposes, was lost off the Pescadores on April 30th owing to an explosion in her magazine. Over 200 lives were lost. A new training squadron has been constituted with the Aso and Soya.

RUSSIA.

Owing to the action of the Duma, the increase of the Russian Navy has been retarded. A considerable programme had been prepared, including four battleships, but the plans are to be delayed until 1911. The reason for the hostility of the Duma to the proposals of the Government was that, in their opinion, a thorough reorganisation of the Admiralty and the naval departments should be the preliminary to the laying down of a number of important vessels. There is also a desire that new vessels should be built in Russia. Some reforms have already been put in hand, and the Russian Admiralty announces that the new ships are to be built in Russia by Russian workmen with Russian materials. A special commission including the Ministers of War, Marine, and Foreign Affairs, with M. Stolypin as President, was appointed in March, 1909, for the reorganisation of the national defences, including the preparation of a shipbuilding programme. The Budget Committee of the Duma, none the less, decided to reject the shipbuilding vote.

Adminis-
tration.

In 1907 Messrs. Vickers prepared a plan for a battleship of 22,000 tons displacement and $21\frac{1}{2}$ knots speed, of which they were willing to supervise the construction in Russia. During 1908, designs and tenders were asked for the construction of a large battleship. Fifteen of the principal firms in the world, including Messrs. Vickers and the Fairfield Company, tendered. The proposals of Messrs. Blohm & Voss were accepted, but they, like Messrs. Vickers, were not prepared to be responsible for the construction of the ship in Russia unless they had practical control of the yard in which she was to be constructed. The Russian Admiralty would not agree, and the proposals therefore fell through.

Sir William White contributed in January, 1909, a letter on the present state of disorganisation in Russian Naval administration to the *Spectator*, which concludes with the following weighty observations: ". . . No real success will be achieved, nor can economical results be obtained, until there is a complete rearrangement of the central organisation of the Russian Admiralty, as well as of the ship-yards and factories. The system of Committees has been so greatly developed that the sense of personal responsibility has been seriously

Sir W.
White's
views.

weakened, and procedure has become dilatory. Russian naval constructors are not lacking in knowledge or professional ability. Russian naval officers have given many proofs of their capacity. Russian artisans are good workmen under proper guidance. But a defective system of administration overshadows all that is done, and in not a few cases where foreign enterprise has responded to official invitations, and established or attempted to establish efficient yards and factories for the construction and equipment of warships, the final results have been most unsatisfactory. Radical reform is necessary before a new and efficient fleet can be created, and the naval prestige of Russia restored."

Rurik.

The armoured cruiser Rurik, built by Messrs. Vickers, Sons & Maxim, has been handed over to the Russian Government. Displacement, 15,170 tons; estimated speed, 21 knots, with 19,700 I.H.P.; armament, four 10-in. and eight 8-in. guns. At the 24-hours' completion trial the engines were run for 10 hours at full power; 20,675 I.H.P. were developed with 141·6 revolutions. As 135 revolutions are calculated to be required for a speed of 21 knots, the contract speed was exceeded. The turrets were tested with exceptional severity at the gun trials. The slight weakness in the roller paths and bolts has been remedied.

The armoured cruiser Admiral Makharoff was completed at La Seyne, and the mining vessel Yenessei and four gunboats, Gilyak, Koreietz, Sivoutch, and Bobr, are ready.

Four new destroyers of the Baranoff class have been added to the Black Sea Fleet, and three Germania submarines will be sent to Sebastopol, as well as the Sudak, built at the Nevsky Yard. Four submarines are in hand at St. Petersburg.

No battleships or cruisers were launched in the year under review.

For the Amur flotilla, eight river gunboats and ten despatch vessels are building at the Baltic Yard.

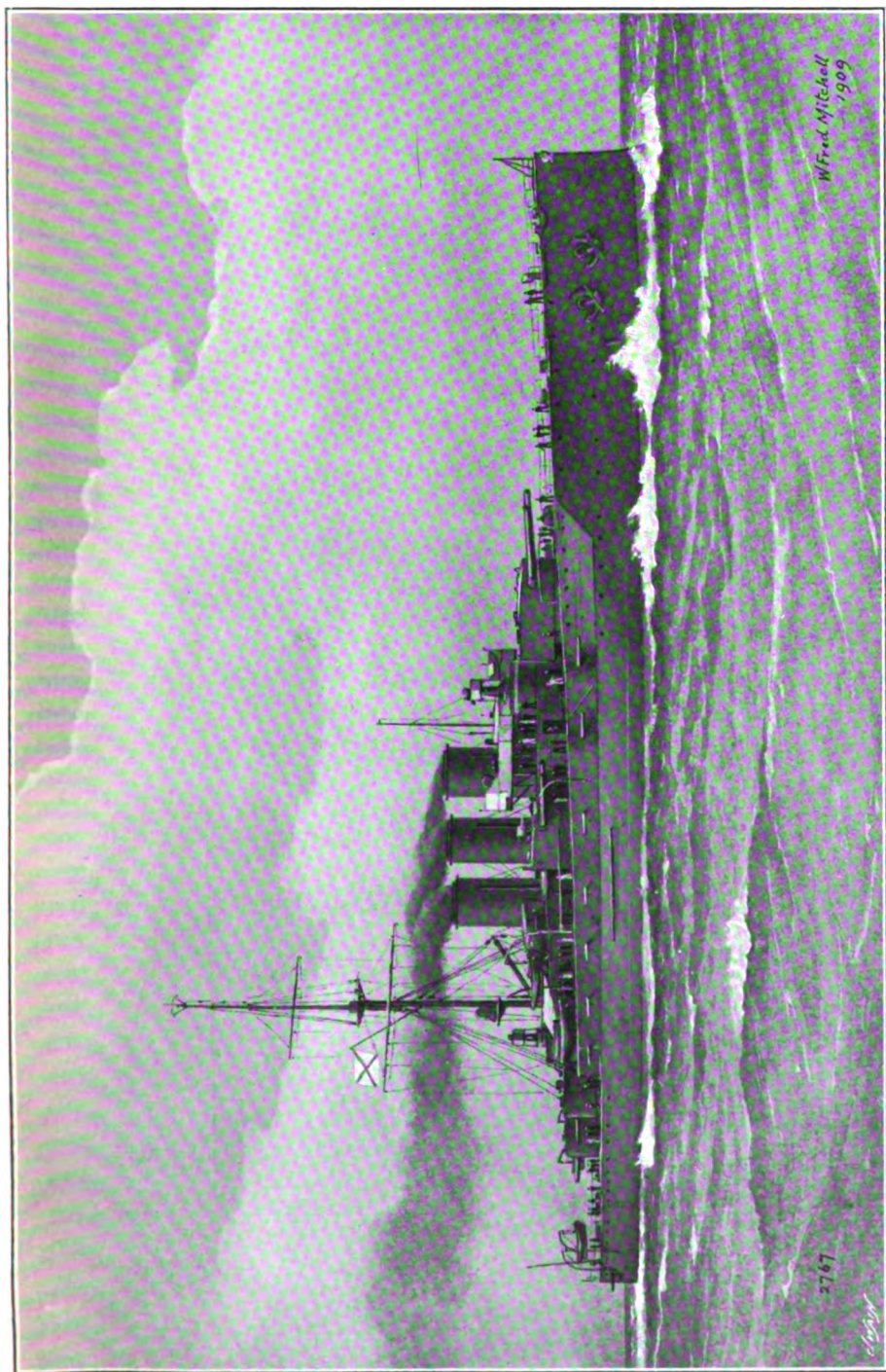
The transfer of the Volunteer Fleet to the Ministry of Commerce is proposed.

UNITED STATES.

Naval
adminis-
tration.

The Secretary of the Navy in his Annual Report, dated November 30th, 1908, refers to the criticisms on naval organisation. Mr. Metcalf says, while it is easy to criticise, it is exceedingly difficult to demonstrate the practicability of any scheme that would involve radical changes in the present Departmental Organisation.

"Under our system of government all executive departments are presided over by a civilian, who is in turn directly responsible to the



RUSSIAN ARMoured CRUISER "RURIK."

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President; and the present Navy Department organisation, which was established more than sixty years ago, was based upon our fundamental system of government and was only adopted after a long and unsatisfactory trial of what was in effect a board of admiralty, namely, the naval commissioners. It may be claimed by some that the increase in the number of bureaus from five to eight was unfortunate, but since the three new bureaus were the Bureaus of Navigation, Equipment, and Steam Engineering, it is difficult to see how the Department could get along without at least one of these bureaus—the Bureau of Navigation. The Bureau of Steam Engineering and the Bureau of Equipment were offshoots from the Bureau of Construction and Repair, and it is possible that a large part of the duties of these two bureaus could be again consolidated with those of the Bureau of Construction and Repair, as was recommended by some of my predecessors. The whole question of Navy Department reorganisation is, however, exceedingly difficult and complex, and it may be that an entirely satisfactory solution is impossible. In other words, the Navy Department is not only a large business organisation, but is fundamentally an organisation which must make provision for the unknown contingencies of war, and, to this extent, can never be administered with a view solely to economy.

“They are in error, however, who assert that there is lack of co-ordination of effort in the Navy Department as at present organised and consequent lack of co-operation in work performed and lack of direct responsibility for errors committed, since my personal experience as Secretary of the Navy convinces me that it would be difficult to find in any large manufacturing establishment, or other industrial organisation, a greater co-ordination of effort among the heads of large departments than there is now, and has been for some time past, among the heads of the great bureaus of the Navy Department. I am, therefore, forced to conclude that, while the present Navy Department organisation may not be an ideal arrangement from an economical standpoint, it is very far from being the irresponsible and impractical organisation which its critics claim it to be; and, while a certain measure of consolidation of duties of the various bureaus at navy yards and certain consolidations among the bureaus themselves may hereafter prove desirable, the general principle of definite and explicit responsibility for the various classes of highly technical work under the several bureaus is sound in theory and practice; that is, moreover, the basis of the organisation of every great industrial establishment, the Navy Department organisation being, of course, more complex in view of the peculiar duties which devolve upon such a military organization.”

Gunnery. With regard to gunnery, the Secretary says that notable progress has been made in the year in marksmanship with guns of all calibres. The enthusiastic interest of officers and men has been stimulated by the present system of competitive target practice between individual guns and ships leading to a marked increase in rapidity of hitting over former years, and to important improvements in ordnance *matériel*. Improvements in powder and projectiles have been the chief features in the development of ordnance in the year.

Mr. Newberry, Mr. Metcalf's successor, recommends that the General Board be by law turned into a general staff, and that a system of promotion by merit, either by selection or by exclusion, be introduced. "Our men come too old and stay for too short a time in high command positions." His recommendations for the appointment of a committee by Congress and the President, to consider the re-organisation of the Navy Department, has been approved by the Senate Committee on Naval affairs.

Progress:
Battle-
ships.

To turn to new construction. The battleship Michigan was launched at Newport News on May 26th, and her sister ship, the South Carolina, from Messrs. Cramp's Yard, at Philadelphia, on July 11th, 1908. Displacement, 16,000 tons; speed, 18·5 knots. These vessel have already been fully described in the *Naval Annual*. The South Carolina will be ready for trials in July, 1909. The cost when completed will be about £1,440,000. The complement will be 51 officers and 618 men.

The battleships North Dakota and Delaware, which were described in the *Naval Annual* of last year, were launched respectively at the Fore River Yard on November 10th, 1908, and at Newport News on February 6th, 1909. Displacement, 20,000 tons; speed, 21 knots. The following additional particulars as to the distribution of armour and armament are taken from the Engineering Supplement to the *Times*.

Armament, ten 12-in. guns, mounted in pairs and carried in five turrets; fourteen 5-in. quick-firers, carried on the broadside in a central armoured battery; and ten or twelve quick-firing guns of smaller calibres. The vertical armour protecting buoyancy and stability includes a belt in the region of the water line, extending from 5ft. below to 8ft. above the normal load-line (26ft. 11in.). This armour is 11in. thick at the upper edge and 9in. at the lower; mean thickness, 10in. Above it stands another "strake" of armour about 7ft. wide, 10in. thick at the lower edge, and 8in. at the upper; mean thickness, 9in. These thicknesses of armour are maintained throughout the whole length of the ships occupied by machinery, boilers, and magazines; and in this respect the protection is undoubtedly superior to that of any other battleship of recent construction. In addition, throughout the length of the battery in which the 5-in. guns are placed the sides are protected by 5-in. armour, carrying the defence to a height of nearly 18ft. above the normal water-line. A strong steel protective deck is placed at the top of the thick water-line belt of armour. The 12-in. guns are protected by armour 10in. to 12in. in thickness. All the vertical armour is to be of Krupp quality and of the most improved manufacture. From the facts above stated it is clear that the North Dakota and Delaware have a greater weight assigned to protective material than can be the case in any British battleship of recent design, having regard to official figures that have been published for the British ships in papers presented to Parliament.

The North Dakota will be fitted with two submerged torpedo tubes. Her propelling machinery is driven by turbines of the Curtis type.

Of the two new battleships of the programme of 1908, the Florida is to be built at the New York Navy Yard, and the Utah will be built by contract. It is understood that these vessels will be similar in all important respects to the Delaware and North Dakota. They will probably be about 7 ft. longer in order to accommodate turbine machinery.

The three scout cruisers, Birmingham, Chester and Salem, have now all completed their trials. The Birmingham has reciprocating engines, driving twin screws, the Chester Parsons turbines, driving four screws, and the Salem Curtis turbines, driving twin screws. The mean speed attained on the four hours' full speed trial was, according to *Engineering*: Birmingham, 24·325 knots; Salem, 25·947 knots; and Chester, 26·52 knots. It is possible that the speed of the last named has been over-estimated.

Five destroyers of 700 tons displacement and 28 knots speed, and ten of 742 tons and 29½ to 30 knots speed, are in hand.

The submarine Octopus has been completed. Four of this type have been ordered, and three of a larger type. Displacement, submerged, 275 tons; speed, submerged, 10 knots; on the surface, 11·57 knots.

The contract for a large submarine—described as a submarine cruiser—has been placed with the Lake Torpedo-boat Company. Displacement, submerged, 500 tons; speed, on surface, 14 knots, and submerged, 9·5 knots. Steaming radius, 3000 knots. The boat is fitted with six torpedo tubes, and will be driven by gasoline.

The cruise of the Battleship Fleet was continued with success, the Fleet receiving a great reception in New Zealand and Australia, as well as in China and Japan. The Fleet, under the command of Rear-Admiral Sperry, left San Francisco on July 7th *en route* for Honolulu, where it arrived on July 16th, leaving again for Auckland on the 22nd, where it arrived on August 9th. From August 9th to August 15th was spent in this port, while Sydney was reached on August 20th, after very heavy weather had been experienced. Rear-Admiral Sperry left Sydney on August 27th, and stayed in Melbourne from August 29th to September 5th. Manila was reached (after coaling at Albany on September 11th) on October 2nd, and Yokohama on October 18th. The Fleet left Yokohama on October 25th, and reached Amoy, China, on October 30th, remaining there until November 5th, and, after calling at Olongapo and Manila, in the Philippine Islands, sailed on December 3rd for Ceylon, arriving on December 13th, on the return journey to the Atlantic Coast. The Fleet

entered the Mediterranean at the beginning of January, and split up into a number of groups, which visited Genoa, Leghorn, Naples, Athens, Marseilles, Villefranche, Malta, and other ports, while the *Culgoa* and the *Yankton* were detached from the Fleet to convey supplies and medical aid to the sufferers by the Messina disaster. At the beginning of February the Fleet reassembled off Gibraltar, and arrived at Hampton Roads on February 22nd, when it was reviewed by President Roosevelt in the *Mayflower*. The following is the order in which the warships went past the *Mayflower*, with the squadron and the division designation of each and the name of her commander:

First Squadron, First Division—Rear-Admiral Charles S. Sperry, commander-in-chief—Connecticut, flagship, Captain Hugo Osterhaus commanding; Kansas, Captain Charles E. Vreeland; Minnesota, Captain John Hubbard; Vermont, Captain Frank F. Fletcher.

Second Division—Rear-Admiral Richard Wainwright, commander—Georgia, flagship, Commander George W. Kline; Nebraska, Captain Reginald F. Nicholson; New Jersey, Captain William H. Sutherland; Rhode Island, Captain Joseph B. Murdock.

Second Squadron, Third Division—Rear-Admiral Seaton Shroeder, commander—Louisiana, flagship, Captain Kossuth Niles; Missouri, Captain Robert M. Doyle; Ohio, Captain Thomas B. Howard; Virginia, Captain Alexander Sharp.

Fourth Division—Rear-Admiral William P. Potter, commander—Wisconsin, flagship, Captain Frank E. Beatty; Illinois, Captain John N. Bowyer; Kearsarge, Lieutenant-Commander Nathan C. Twining; Kentucky, Captain Walter C. Cowles.

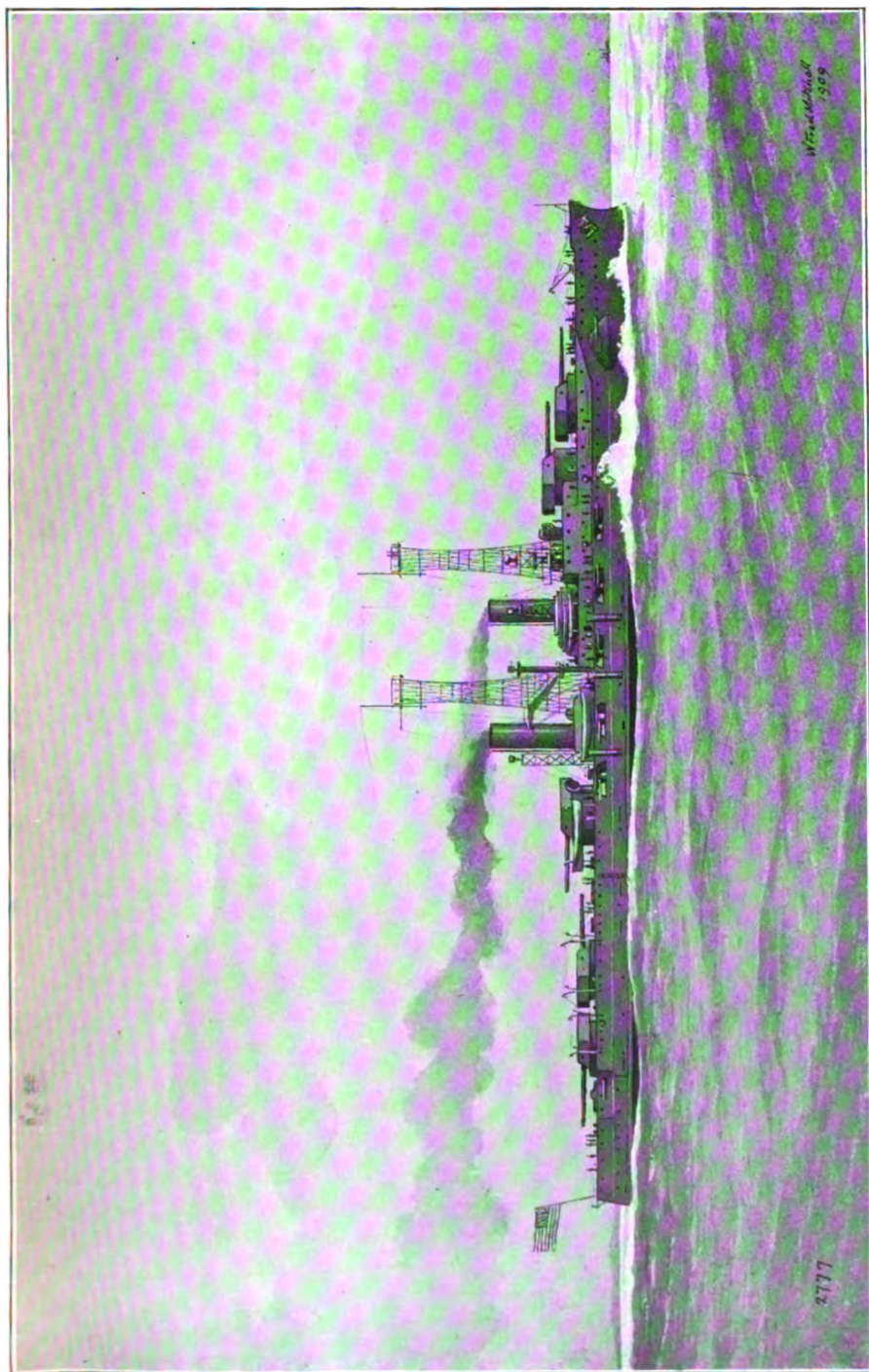
Third, or Escort Squadron—Rear-Admiral Conway H. Arnold, commander—Maine, flagship, Captain William D. Caperton; Idaho, Captain James M. Holm; Mississippi, Captain John C. Fremont; Montana, Captain Alfred Reynolds; New Hampshire, Captain Cameron McR. Winslow; North Carolina, Captain William A. Marshall; Salem, scout cruiser, Commander Albert L. Key; Birmingham, scout cruiser, Captain Burns T. Walling; Chester, scout cruiser, Commander Henry B. Wilson.

The voyage of the Fleet occupied 432 days, of which 189 days were spent in port, and the total distance covered was about 45,000 miles. During the second section of the voyage from San Francisco onwards 30,000 miles were covered in 172 days' steaming. The average speed maintained was about 10 knots. The quantity of coal burned was 400,320 tons, costing (including transportation by naval and hired colliers) £529,214. With the exception of a typhoon on the passage from Manila to Japan and rough seas on the coasts of Australia and after leaving Gibraltar, the Fleet experienced fine weather. The Wisconsin and Nebraska took the places of the Alabama and Maine at San Francisco; otherwise the Fleet may be said to have returned home intact. One of the most remarkable features of the voyage was that the Fleet was able to effect necessary repairs from its own resources, a fact to which both Rear-Admiral Sperry and the Secretary of the Navy direct attention in the remarks quoted below.

Some of the important features of the cruise are summed up by Rear-Admiral Sperry as follows:—

“This cruise makes an epoch in our naval annals, for the Fleet

Admiral
Sperry
on the
voyage.



AMERICAN BATTLESHIP "NORTH DAKOTA."

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has found itself—been welded into a unity. An aggregation of battleships, irrespective of the power and efficiency of the individual units, is not a fleet in the highest sense of the term until by long, faithful, and harmonious work on the part of the *personnel* the spirit of the Fleet has been developed. That now has been accomplished. The American people have come to appreciate the importance of sea-power as one of the most potent factors in the preservation of a just peace, and they should appreciate what it means to have a Fleet like this.

“The lessons of the cruise have been many, and it is no exaggeration to say that the condition of the ships is better to-day than when they sailed from Hampton Roads in December of 1907. During these fourteen months the Fleet has been practically self-sustaining in the matter of repairs. The officers and men responsible for repairs have met every test, and the results prove that the ships have been better cared for than when they depended upon the Navy yards.

“Enlistments in the Navy certainly will be stimulated by general interest in this cruise and the splendid opportunities afforded the men to see the world. Cruises to foreign ports which keep the men interested and contented should be the rule and not the exception.

“New standards of efficiency in steam-engineering, which means economy in coal consumption and increased radius of action, have been established. The voyage of 3651 miles from Honolulu to Auckland was the longest ever undertaken by a large fleet without recoaling, yet we reached Auckland with coal enough in our bunkers to steam an additional thousand miles.

“For technical work the cruise has been ideal. The long stretches between ports permitted unremitting daily exercise and manœuvring. The degree of gunnery efficiency has been greatly improved, as the conditions of drilling and training during long distance cruising cannot be equalled in Home waters where there is constant interference. This is proved by the unequalled results of the target practice at Magdalena Bay and Manila.”

The Secretary of the Navy in his report says :—“The carrying out of the plans and arrangements for the cruise of the Battleship Fleet without change or modification reflects great credit on the several bureaus concerned, and particularly on the Bureaus of Steam Engineering, Equipment, Supplies and Accounts, and Construction and Repair. The prophecies as to the demoralised condition of the *matériel* after such a cruise have not come true. The ships have practically taken care of their own repairs during the voyage. The effect of the cruise upon the discipline of the men has been beneficial.

The
Secretary
on the
voyage.

Too much cannot be said of the magnificent conduct of the enlisted *personnel* during the voyage."

Pro-
gramme.

The building programme for 1909 of the General Board, in which the Department concurred, comprised four battleships, four scout cruisers, ten destroyers, four submarines, three colliers, one repair-ship, and two mine-laying ships, for which purpose two cruisers will be converted. Mr. Metcalf recommended that the battleships should have the same speed and turning circle as the North Dakota class, and, though an improvement on the North Dakota, should be of the single calibre big-gun type. He urged upon the Committee the wisdom of providing for four battleships of 26,000 tons, with an armament of twelve 12-in. 50-calibre guns, which vessels he estimated would cost £1,952,000 each. The ships would have a larger displacement than the Florida class, but with the same speed and general characteristics, while having a more powerful armament by two guns. They would be heavily armoured. An alternative design for a battleship armed with 14-in. guns was prepared by the Naval Board on Construction. Mr. Metcalf thought that the scout cruisers should number one for every battleship, and should be of the Salem type. The appropriation for new construction as proposed by the General Board amounted to £15,000,000. This was cut down by the House Committee on Naval Affairs to £5,800,000, and the construction was authorised of only two battleships (instead of four), five (instead of ten) destroyers, four submarines, and four fleet colliers. The cruisers were struck out.

In April of last year President Roosevelt used all his influence to persuade Congress to authorise the construction of four battleships of the most advanced type in 1908, but his efforts were without avail, and the Senate by large majorities confirmed the action of the House of Representatives in cutting down the programme from four to two ships. It is evident that Congress is still averse to embarking on a large shipbuilding programme.

Personnel.

The United States Marines have been withdrawn during the past year from the service afloat, and in future will garrison the Navy Yards and Stations both at home and abroad. The U.S. Marine Corps was established in 1776.

Dock-
yards.

With regard to dockyards, Secretary Newberry stated before the House Naval Committee that for the Florida, 510 ft. long, 88 ft. wide, 521 ft. 6 in. over all, and 28 ft. 6 in. draught, the only dry docks existent or projected of sufficient capacity to dock the ship are at Portsmouth, Boston, New York, Philadelphia, Norfolk, Charleston, Mare Island, and Puget Sound. The docks at Portsmouth, Boston, Philadelphia, Norfolk, Charleston, and Mare Island are either

ready to dock such a ship or will be ready before the ship has been completed. Also the floating dock Dewey at Olongapo could raise such a ship until the deck of the dry dock is about awash. It has been calculated that the floating dock at New Orleans could partially lift such a vessel out of the water, so that a considerable part of its hull would be exposed for repairs.

MINOR NAVIES.

ARGENTINE REPUBLIC.

The Chamber, by 49 votes to 13, sanctioned in December the Bill authorising the expenditure of £11,000,000 on armaments. The programme of naval construction includes two, and possibly three, battleships and eighteen destroyers. It was not to be expected that the Argentine Republic would allow Brazil's Naval programme to remain unanswered; and it is stated that if Brazil continues to increase her Fleet, the third battleship and seven additional destroyers will be laid down. According to a Brazilian newspaper the battleships will be of 19,000 tons displacement and 21 knots speed. Armament, ten 12-in., fourteen 6-in., and eighteen smaller Q.F. guns. They will be protected by armour of a maximum thickness of 12 in.; will be driven by turbines; and will have hydraulic, and not electric, power for working the turrets.

The armoured river gun-boats Parana and Rosario were launched at Elswick at the end of April and on July 27th respectively. Displacement, 1000 tons; length between perpendiculars, 240 ft.; beam, 22 ft. 3 in.; mean draught, 7 ft. 6 in. Protection is afforded by 3·2-in. armour on the sides and by a 1-in. deck. Armament, two 6-in. howitzers, six 12 prs., four field guns, and eight maxims. Estimated speed 15 knots; total capacity 120 tons.

AUSTRIA.

The Navy Estimates for 1909 amount to £2,687,500, of which £187,500 is on account of extraordinary expenditure. The Estimates for 1908 amounted to £2,375,000, showing an increase of £400,000 on those for 1907. Austrian Naval expenditure has therefore been increased by £700,000 in the last two years. There has been none the less a severe attack upon the Naval Department for its want of energy and alleged neglect of the interests of the country.

The three new battleships to replace the Rudolf, Stephanie, and Tegetthoff are to be named Erzherzog Franz Ferdinand, Radetzky, and Zrinyi. The Franz Ferdinand was launched at the Stabilimento Tecnico at Trieste on September 30th, 1908. Displacement, 14,500 tons; I.H.P., 20,000; speed, 20 knots. The armament comprises

Battle-ships.

four 12-in., eight 9·4-in., and twenty 3·9-in. guns. The maximum thickness of the water-line belt consists of 9 in. of Krupp steel, tapering to 4 in. at the bow and stern. The side above the belt is protected by 6-in. armour. The protection for the main armament consists of 10 in. of Krupp steel, and for the 9·4-in. guns of 8 in. of Krupp steel. The 12-in. guns are mounted in two turrets on the centre line forward and aft. The 9·4-in. guns are mounted in pairs on either side. The 3·9-in. guns are mounted in a battery on the main deck protected by 4·7-in. armour.

The torpedo cruiser to replace the *Zara*, of which some particulars were given last year, is to be named the *Admiral Spaun*. Displacement, 3500 tons; length, 411 ft.; beam, 42 ft.

Torpedo
flotilla.

The six destroyers building at Fiume have been named *Dinara*, *Csikós*, *Pandúr*, *Rêka*, *Turul*, and *Velebit*. Displacement, 383 tons; I.H.P., 6000; Yarrow water-tube boilers; speed, 28–29 knots; armament, one 12-pr., seven 3-prs.

The ten sea-going torpedo boats also building at Fiume have been named *Triton*, *Alk*, *Echse*, *Hydra*, *Kormoran*, *Krake*, *Molch*, *Phönix*, *Polyp*, and *Skorpion*. Displacement, 200 tons; I.H.P., 3000; speed, 25 knots.

Sub-
marines.

The following submarines are under construction: U 1 and U 2 (Lake type) at Pola, U 3 and U 4 (Krupp type) at the Germania Yard, Kiel, U 5 and U 6 at Whitehead's Yard, Fiume. The latter are described as of the Whitehead type, being improved from the United States Octopus type, under agreement with the Electric Boat Company of New Jersey. U 3 has been delivered, U 5 has been launched, and U 7 has been recently laid down at Fiume.

A floating dock, capable of taking ships up to 20,000 tons displacement, is to be built for Pola.

New pro-
gramme.

Admiral Montecuccoli announced in the discussion on the Navy Estimates that the future battleships to be built for the Austrian Navy would be of from 18,000 to 19,000 tons displacement. Herr Popper, Chief Naval Designer to the Stabilimento Tecnico of Trieste, is understood to be preparing plans of battleships of about this size, which will be laid down as soon as the remaining battleships of the *Franz Ferdinand* class have been launched. If these larger battleships are laid down, Sir William White anticipates that the expenditure on new construction will rise to £2,700,000 per annum, with a corresponding increase in the *personnel* and other votes.

BRAZIL.

Mention was made last year of the three large battleships building for Brazil, two at Elswick and one at Barrow.

The Minas Geraes was launched at Elswick on September 10th, 1908. Displacement, 19,500 tons; length, 500 ft.; beam, 83 ft.; draught, 25 ft. The Minas Geraes will be propelled by reciprocating engines, and the contract speed is 21 knots. She can carry 2400 tons of coal, and is fitted for burning liquid fuel. The boilers will be of the Babcock & Wilcox type. The armament consists of twelve 12-in. and twenty-two 4·7-in. guns. A beautiful model of the ship was shown at the Franco-British Exhibition. From this it appears that eight 12-in. guns are mounted in barbettes on the centre line of the vessel. The inner barbettes are on a higher level than the forward and aft barbettes, the guns in them firing immediately over the top of the latter. The four remaining 12-in. guns are mounted in barbettes on either side amidships. This distribution of the main armament gives a fire forward and aft from eight 12-in. guns, and on the broadside from ten 12-in. guns. Of the 4·7-in. guns, fourteen are mounted in a battery on the main deck and eight at the angles of the superstructure. The belt armour is to be of 9-in. Krupp cemented steel, tapering slightly forward and aft. The same thickness is carried to the height of the upper deck over the citadel. The transverse bulkheads are of 9-in. armour and the protective deck 2 in. in thickness. All these ships are to be fitted with turbines.

Two scout cruisers, named the Bahia and Rio Grande, of which the former was launched on January 20th, are under construction at Elswick. Displacement, 3100 tons; estimated speed, 26 knots; length between perpendiculars, 380 ft.; beam, 39 ft.; mean draught, 13 ft. 6 in. The protective deck varies in thickness from $\frac{3}{4}$ in. to 1 $\frac{1}{4}$ in. The armament will consist of ten 4·7-in. guns, six 3-prs., and two above-water torpedo tubes.

Scout
cruisers.

Of the ten destroyers which are being built by Messrs. Yarrow for the Brazilian Government at their new yard at Glasgow, the Para and the Piahy have been completed, and have arrived in Brazil. The Amazonas is going through her trials. The Matto Grosso was launched on December 23rd, 1908, and the Rio Grande del Norte on March 9th, 1909. Displacement, 550 tons; length, 240 ft.; beam, 23 ft. 6 in. The contract speed of 27 knots has been attained by the destroyers already completed. The others are named Parahyba, Alagoas, Santa Catharina, Parana, and Sergipe.

CHINA.

A Naval Department is reported to have been created.

An ambitious programme of new construction has been discussed in China, but no definite action has been taken or is likely to be

taken at present. The river gunboat described as a patrol cruiser has been launched at Hongkong for service on the West River.

DENMARK.

The Naval Estimates for 1909 amount to £462,500.

The coast defence ship *Peder Skram* was launched on May 2nd at the Copenhagen Dockyard. She is slightly larger than the *Herluf Trolle*. Displacement, 3543 tons; length, 274 ft. 3 in.; beam, 51 ft. 6 in.; draught, 16½ ft.; I.H.P., 4600; speed, 16·5 knots. The armament consists of two 9·4-in. and four 5·9-in. guns. The former are mounted on the centre line in turrets protected by 7-in. armour, and the latter at the angles of the superstructure in casemates, protected by 6-in. armour. The belt armour is 8-in., and the protected deck 2-in. in thickness.

The Premier, Mr. Norgaard, electrified the Folkething by proposing on February 12th, 1909, a credit for £2,344,440 for the land and sea fortifications, the construction of twenty torpedo-boats, six submarines, etc. In view of the development of German sea-power, Denmark occupies a position of great strategic importance.

GREECE.

The *Sfendoni*, the last of the four destroyers built by Messrs. Yarrow, was delivered in July. Displacement, 350 tons. The following are the speeds obtained on trial by the destroyers of this type:—*Thyella*, 31·79 knots; *Naukatoussa*, 32·1 knots; *Lonchi*, 32·53 knots; *Sfendoni*, 31·84 knots.

MEXICO.

The transport cruiser *General Guerrero* has been completed at Barrow.

THE NETHERLANDS.

The Navy Estimates for 1909 amount to £1,563,000.

The *Jacob van Heemskerck*, particulars of which were given last year, has been completed. Another small battleship, the *Zeven Provinciën*, has been laid down at the Amsterdam Dockyard. Displacement, 6525 tons; length, 339 ft. 6 in.; beam, 56 ft.; draught, 20½ ft. The armament consists of two 11-in., four 5·9-in., and ten 3-in. guns. The 11-in. guns are mounted in barbettes of 10-in. Krupp nickel steel. The waterline belt has a thickness amidships of 6 in., tapering to 4 in. at the ends. The deck is 2 in. in thickness. I.H.P., 7500; speed, 16 knots. The ship is fitted with Yarrow boilers, and can carry 700 tons of coal. Complement 440.

Votes are taken in the estimates for the refit of two of the coast defence ships of the Kortenaer type, for laying down a submersible larger than the Luctor-et-Emergo, and also for laying down two large destroyers of 31 knots speed for service in the Dutch Indies.

Owing to the differences with Venezuela the Jacob van Heemskerck and the cruisers Gelderland and Friesland have been employed blockading Venezuelan ports. A Venezuelan coast-guard ship, Alexis, was seized by the Gelderland in December.

NORWAY.

The expenditure from April 1st, 1908, to March 31st, 1909, was estimated at £587,268, and a supplementary estimate, covering the period from that date to June 30th, amounts to £148,082. The establishment of officers will be 124, being an addition of five commanders. Charges are included for the completion of the destroyer Draug at Horten, and the carrying forward of the sister boat Troll. A sum of £57,200 is to be devoted to the building of submarine boats. The old gunboats Brage and Vidar are to have their 10·6-in. muzzle-loaders replaced by 4·7-in. quick-firers, taken from the monitors that were sold. The total estimates for 1909-10 are £581,130, and provide for the completion of the Troll (£42,900), for submarine boats (£45,000), for a floating dock (£23,100), and for the laying down of a coast defence armourclad (£22,000).

SPAIN.

Allusion was made last year to the programme for the re-organisation of the Spanish Navy, authorised by the Cortes on January 7th, 1908. A Spanish-British syndicate, comprising the Spanish Naval Construction Company, Messrs. Armstrong, Whitworth & Co., Messrs. Vickers, Sons & Maxim, and Messrs. J. Brown & Co., has been entrusted with the carrying out of the programme.

According to a well-informed article in *Engineering*, from which the details given below are summarised, the programme provides for the construction in the next six years of three battleships of 14,760 tons displacement on trial with normal coal supply, of four gunboats of 800 tons displacement, three destroyers of 350 tons displacement, and twenty-four torpedo-boats of about 180 tons displacement. The battleships are to be built at Ferrol and the gunboats at Cartagena, both of which dockyards are to be practically brought up to date. Some of the destroyers and torpedo-boats are to be built by Messrs. Normand at Havre.

The armament of the battleships will comprise eight 12-in. and twenty 4-in. guns. The 12-in. guns are to be of 50 calibres in length

New programme.

Battle-ships.

instead of 45 calibres, as in the Dreadnought, the effect of which is to increase the energy developed by 30 per cent. They are to be mounted in pairs in eight barbettes, the midship barbettes being placed in échelon, as in the Indomitable. Hydraulic mechanism is to be adopted for operating the barbette guns. Protection is to be given by an armoured belt 9 in. thick amidships, tapering to 4 in. at the ends. The belt is to be 6 ft. 6 in. wide, and it is stipulated that it must extend 4 ft. 7 in. below water-line, and extend forward and aft far enough to include the bow and stern barbettes. Explosion bulkheads of moderately thick armour are to be fitted in order to protect the machinery and magazines against torpedo attack. Above the water-line belt there is to be a strake of armour 7 in. thick amidships. The barbettes are to be of 10 in. armour. There are to be two armoured decks, one near the water-line and another to coincide with the battery deck. All the armour must be of the latest process of manufacture adopted by the British Admiralty. Parsons turbines have been adopted, and the designed speed is $19\frac{1}{2}$ knots. The range of action is to be 5000 miles at economical speed.

The gunboats are to have a speed of 13 knots, and will be armed with four 3-in. and two machine guns. The destroyers are to have a speed of not less than 28 knots, and carry an armament of five 2·2-in. guns. The torpedo-boats will have a speed of 25 knots.

At Ferrol, building slips, a graving dock capable of taking ships of 600 ft. in length, of 100 ft. in beam, and a draught of nearly 40 ft., and extensive machine shops will be constructed. The harbour is to be dredged to a depth of nearly 28 ft. Guns, armour, constructional steel, and probably engines and boilers, will in the first instance be supplied from England; but the intention is gradually to train up a Spanish *personnel* for the reconstituted dockyards and factories.

From the above it is clear that the reconstruction of the Spanish Navy is being taken in hand on a well-considered plan, and with the co-operation of firms whose names are a guarantee that the work will be effectively carried out.

SWEDEN.

The Naval Estimates for 1909 amount to £1,474,150, of which £431,130 is extraordinary expenditure. One destroyer and four torpedo boats are to be completed, and two destroyers and four torpedo boats are to be advanced.

The Gothenburg works are to build a destroyer fitted with Curtis turbines, which will be of Swedish material but constructed by the Vulcan Yard, Stettin. I.H.P., 7800; speed, 30 knots.

The destroyer *Wale*, built by Korkum & Co., attained a speed of 31·25 knots for three hours.

TURKEY.

The most important event for many years in the history of the Turkish Navy is the appointment of Real-Admiral Gamble, who attained to flag-rank on September 2nd, 1908, to superintend the reorganisation of the Turkish Navy.

A programme is under consideration extending over eight years and involving the sum of 16 millions. It is stated to include six battleships, twelve destroyers, twelve torpedo boats, twenty-four gun-boats, and six submarines.

CHAPTER III.

COMPARATIVE STRENGTH.

Compara-
tive
strength.

THE most noticeable features in the year under review have been the increased rate of progress of construction and the large addition to shipbuilding resources in Germany, the delays, owing to labour troubles, in the completion of several British battleships and cruiser-battleships as they must now be called; the refusal of Congress for the second time to embark on the large programme of Naval expansion proposed by the Naval Department and vigorously supported by President Roosevelt, and the continued deplorable condition of the French Navy, which has been described in the previous chapter.

For the United States Navy only one battleship, the Idaho, has been completed, though four battleships have been launched. In Germany two battleships of the Deutschland class have been completed and three of the Dreadnought type have been launched. In France no battleship has been completed. Only one of the six ships of the Danton class has been launched, and none are likely to be completed till the end of 1910. Japan and Italy have each completed one battleship, while in Russia the programme of new construction of the Navy has been postponed. The relative strength of the Navies, therefore, remains much the same as last year, with the exception that Germany has somewhat improved her position.

Ships in
com-
mission.

The list of British, German, and French Fleets in commission in European waters is given in the table opposite.

The Home
Fleet.

There has been an important change in the organisation of British Squadrons in Home waters. The Home Fleet, of which Admiral Sir William May has been placed in chief command, has been organised in four Divisions. The Nore Division of the Home Fleet becomes the First Division, and is intended to comprise the most modern and powerful ships. The Channel Fleet reduced to eight battleships becomes the Second Division of the Home Fleet under the orders of Sir A. B. Milne, who has succeeded Lord Charles Beresford. Vice-Admiral George Neville has been appointed to command the Third Division, which consists of ships with nucleus crews. His headquarters will be at Sheerness, while the new Commander-in-Chief will live afloat while his flag is flying. The Fourth Division includes the older battleships of the Royal Sovereign class, the Barfleur, Centurion and Nile, which are placed in Table II. of the Comparative Tables. The First and Second Divisions of the

CLASS.	GREAT BRITAIN.			GERMANY.		FRANCE.		
	MEDITERRANEAN.	ATLANTIC FLEET.	HOME FLEET. ✓	HIGH SEA FLEET.	NORTHERN SQUADRON.	MEDITERRANEAN.	Reserve.	
BATTLESHIPS	Duncan Exmouth Canopus Ocean Swiftsure Triumph	Queen Prince of Wales Albemarle Cornwallis Russell Albion	1st Division. Dreadnought Bellerophon Agamemnon Lord Nelson Bulwark Formidable Implacable Irresistible	1st SQUADRON. Hannover Schlesien Mecklenburg Zähringen Wittelsbach Wettin K. Karl der Grosse K. Barbarossa 2ND SQUADRON. Schleswig Holstein Elsass Hessen Preussen Lothringen Deutschland Pommern Braunschweig	..	1st DIVISION. Patrie République Démocratique 2ND DIVISION. Justice Liberté Vérité	3RD DIVISION. Suffren Bouvet Jauréguiberry 4TH DIVISION. Charlemagne Gaulois St. Louis	
	6TH SQUADRON. Bacchante Aboukir Lancaster Suffolk	5TH SQUADRON. Good Hope Black Prince D. of Edinburgh Argyll	1st CRUISER SQUADRON. Drake Indomitable Inflexible Invincible Minotaur	Scharnhorst Gneisenau Roon York	Léon Gambetta Amiral Aube Gueydon Dupetit-Thouais Marseillaise Gloire Kléber Dupuy de Lôme	Jules Ferry Victor Hugo Jules Michel	Condé	
CRUISERS, 1st Class	Diana Minerva	Arrogant Venus	Juno Talbot	..	..	..	..
CRUISERS, 2nd Class	Barham Philonel	Amethyst	.. ..	6	Iely Du Chayla Forbin Cosmao Lavoisier	Galilée Lalande Descartes Cassard	8 ||	
DESTROYERS	11	..	24 24*	11	13 †	8 ||	..	
ATTACHED TO DESTROYERS	..	..	Topaze 2 Scouts Sapphiro 2 Scouts	..	..	..	..

* Besides 6 with nucleus crews at Portland.

† Besides 12 at various ports.

‡ In Morocco.

|| Besides 10 at various ports.

* Besides 6 with nucleus crews at Portland. ‡ Besides 19 at various ports. § In Morocco. || Besides 10 at various ports.

Home Fleet are shown in the table opposite. The number of destroyers and attached ships in full commission, and in commission with nucleus crews, remains the same as last year.

The First Division or old Home Fleet has been considerably strengthened during the year by the addition of the battleships Lord Nelson and Bellerophon, which were not completed until many months later than anticipated, and of the three cruiser-battleships Indomitable, Inflexible and Invincible. It will be further strengthened during the year by the substitution of other Dreadnoughts now completing for the battleships of the Bulwark class. The Second Division of the Home Fleet comprises the eight King Edwards. The composition of the Third and Fourth Divisions is given below.

HOME FLEET.
THIRD DIVISION.

CLASS.	THE NORE.	PORTSMOUTH.	DEVONPORT.
BATTLESHIPS	Magnificent Victorious	Illustrious Jupiter	Cæsar Hannibal Majestic Mars
CRUISERS, 1st Class	Achilles Antrim Roxburgh	Essex Hampshire	Carnarvon Devonshire Sutlej
CRUISERS, 2nd Class	Charybdis Vindictive		Doris Highflyer
CRUISERS, 3rd Class		Forte Iphigenia Latona	
TORPEDO GUNBOATS	Jason Speedy	Seagull Speedwell	Circe Gossamer Hebe Sharpshooter
DESTROYER FLOTILLAS			
DESTROYERS	24	26	19
ATTACHED TO DESTROYERS	2 Scouts	1 Scout	1 Scout
TORPEDO BOATS	6	12	10
DEPÔT SHIP	Blake	Hecla	Leander

SUBMARINES.

Section I.—Depôt ship—Forth. Submarines, Nos. B2, B3, B5, B6, B7, B8, B9, B10, B11.

Section II.—Depôt ship—Bonaventure. Submarines, Nos. C10, C11, C12, C13, C14, C15, C16, C17.

Section III.—Depôt ship—Thames. Submarines, C1, C2, C3, C4, C5, C6, C7, C8, C9.

Section IV.—Depôt ship—Mercury. Submarines, A6, A11, A12, A13, B1, B4.

Additional depôt ships—Hazard, Vulcan.

HOME FLEET.

FOURTH DIVISION.

CLASS.	THE NORE.	PORTSMOUTH.	DEVONPORT.
BATTLESHIPS . . .	Vengeance . . .	Barfleur . . . Centurion Renown	Royal Sovereign Ramillies Hood Resolution Royal Oak Repulse Empress of India Nile
CRUISERS—1ST CLASS.	. . . . .	Ariadne . . . Argonaut Spartiate Terrible	Europa Amphitrite Andromeda Niobe
CRUISERS—2ND CLASS.	. . . . .	Crescent . . . Edgar Hawke Royal Arthur	Gibraltar
CRUISERS—3RD CLASS.	. . . . .	Sappho . . .	Medea Sirius

The Fourth Cruiser Squadron includes the first class cruisers Cressy (which will be relieved by the Berwick), Donegal, and Euryalus (which will be relieved by the Leviathan); the third class cruisers Brilliant, Indefatigable, and Scylla. The first class cruisers Cornwall and Cumberland, which are employed for training cadets, are attached to this squadron.

In addition to the above there are the following torpedo-boats in commission :—

	With Full Crews.	With Nucleus Crews.
Sheerness-Chatham	9	11
Portsmouth	5	14
Devonport	6	7

There are ten submarines at Portsmouth and four at Devonport.

The Atlantic Fleet, which will in future use Dover as a base as well as Berehaven, comprises the same number of battleships as last year. The Queen and Prince of Wales have been transferred to the Atlantic from the Mediterranean Fleet, thus further weakening the latter. The Swiftsure and Triumph replace the Glory and Goliath. The Fifth Cruiser Squadron is attached to the

Atlantic
and
Mediterranean
Fleets.

Atlantic and the Sixth Cruiser Squadron to the Mediterranean Fleet.

Germany. The German High Sea Fleet is of practically the same strength as last year. The Hannover and Schlesien have been substituted for two of the battleships of the Kaiser class.

France. There is no change of importance to note in the French Squadrons. The battleship strength of the French Navy is concentrated in the Mediterranean, while the Northern Squadron is composed of six armoured cruisers. The Kélber, Dupuy de Lôme, and the third-class cruisers included with the Northern Squadron are on detached service.

Italy. The Italian Naval force in the Mediterranean, which is in full commission for seven months, and in commission with reduced complements for five months, is to include four battleships of the Regina Elena type, of which the Roma is not yet completed, two of the Regina Margherita type, three battleships of the old Sicilia class, two armoured cruisers of the new Pisa type, and three of the Garibaldi type. The Regina Elena, Vittorio Emmanuele and Napoli now constitute what is called the *Divisione Volante*.

Austria. The Austrian Active Squadron consists, as last year, of the three battleships of the Erzherzog class.

Russia. There is no change of importance to record as regards Russia.

The following table gives the number of battleships in full commission for the British, German, and French Navies, for 1899 and certain subsequent years:—

Year.	GREAT BRITAIN.					GERMANY.		FRANCE.			
	Mediterranean.	Atlantic.	Home.	Channel.¶	Total.	Battle Fleet.	Reserve.	Northern Squadron.	Mediterranean.		Total.
									Active.	Reserve.	
1899	11	8	—	10	29	7	—	6	6	9	21
1903	14	6	—	10	30	8	—	5	6	3	14
1906	8	8	13	16	45	15	8†	6	6	3	15
1907	6	6	13*	14	39	16	10†	3	6	6	15
1908	6	6	12*	14	38	16	3§	—	6	6	12
1909	6	6	16‡	8	36	16	3§	—	6	6	12

* Six in full commission.

† Eight in full commission.

‡ Includes eight coast-defence ships.

§ Includes two coast-defence ships.

¶ In 1909 becomes second division of Home Fleet.

The following is a list of the Squadrons kept in commission by the principal Naval Powers in Eastern waters :—

	<i>Britain.</i>	<i>Germany.</i>	<i>France.</i>	<i>United States.</i>
CRUISERS (1st Class)	King Alfred. Bedford. Monmouth. Kent. Powerful (A.)	Fürst Bismarck.		Charleston. St. Louis. Milwaukee.
CRUISERS (2nd Class)	Hyacinth (E.I.) Challenger. Encounter.		Bruix. D'Entrecasteaux.	
CRUISERS (3rd Class)	Astræa. Flora. Fox (E.I.) Cambrian (A.) Perseus (E.I.) Proserpine (E.I.) Pegasus (A.) Pioneer (A.) Prometheus (A.) Psyche (A.) Pyramus (A.)	Arcona. Niobe. Leipzig. Condor (A.)	Alger. Latouche-Tréville. Catinat (P.)	Cleveland. Denver. Galveston. Chattanooga.

A. = Australia. E.I. = East Indies. P. = Pacific.

The United States Pacific Fleet consists of the following armoured cruisers :—

1ST SQUADRON.		2nd Division.
1st Division.	West Virginia.	Tennessee.
	Colorado.	California.
	Maryland.	South Dakota.
	Pennsylvania.	Washington.

The First Squadron was on the Pacific coast of the United States during the winter, but may be considered available for service in Eastern waters in case of necessity. Two Monitors, the Monadnock and the Monterey, are in reserve at Olongapo, and four destroyers are in commission at Cavite in the Philippine Islands.

There is no important change in the comparative tables of this year. After some hesitation, the Indomitable class and the German cruisers Von der Tann and G are classified, as before, with the armoured cruisers, though they possess the armament of battleships, and would doubtless be used as such by any Admiral in whose fleet they were included. The only battleships struck off the list are the French Hoche, the Italian Andrea Doria, and the Russian Sinope.

A new table has been added showing the number of destroyers, torpedo-boats, and submarines built and building.

The present position as regards battleships is shown in the following table :—

	<i>Britain.</i>	<i>United States.</i>	<i>Germany.</i>	<i>France.</i>	<i>Japan.</i>	<i>Russia.</i>	<i>Italy.</i>
Built . .	56*	25	24	18	13	8	10
Building .	5	6	7	6	3	4	3
Total .	61	31	31	24	16	12	13

* Includes *Temeraire*, which will be completed in May.

Comparative
tables.

Battle-
ships.

E

Modern
battle-
ships.

Of completed battleships of all classes we have fifty-six, to a total of forty-nine for the United States and Germany.

Of modern battleships we have forty-three completed, as compared with forty-one for the United States and Germany. Including ships under construction, we have forty-eight battleships, as compared with fifty-seven for Germany and the United States. These figures bear out the contention of those who have been agitating during the past year for a large programme of new construction. The most significant feature of the above table is that, apart from any ships included in the programme for 1909-10, we have only five battleships under construction, as compared with sixteen for Germany and the United States and six for France. The following table is a forecast of the relative position of the five leading Navies at the end of 1909, 1910, and 1911 :—

	BRITAIN.	UNITED STATES.	GERMANY.	FRANCE.	JAPAN.
1909 (end) .	44	21	22	9	12
1910 (to be completed)	3	2	2	2	—
1910 (end) .	47	23	24	11	12
1911 (to be completed)	1 & 4*	2	3	4	2
1911 (end) .	48 52*	25	27	15	14
1912 (to be completed)	— 4*	2	3	—	—
1912 (end) .	— 56*	27	30	15	—

* Figures in italics show ships of 1909-10 programme.

It is evident from the above tables that our relative position would rapidly deteriorate unless more battleships were laid down in 1909. In 1911 only one battleship would be completed for the British Navy, as compared with two for the United States, three for Germany, and four for France. If we include the cruiser battleships of the Inflexible type building in this country and in Germany the position of the British and German Navies would be somewhat improved as compared with the other Navies. Japan is also reported to be considering the advisability of building large cruiser-battleships, but nothing has apparently yet been settled.

Pro-
gramme
1909-10.

The shipbuilding programme for 1909-10 has been published since these pages were in print. Four battleships are to be laid down in 1909, and if Admiralty anticipations are realised they should be completed by the end of 1911. But experience has shown that, whether from labour troubles or other causes, the estimate of two years for the construction of a battleship cannot be relied upon, and

that it would be safer to calculate that we cannot build more rapidly than the Germans.

The First Lord asks in his Memorandum for powers to order the material, machinery, and guns for four more battleships, which H.M. Government may find it necessary to lay down at the beginning of the financial year 1910-11. The speech which Mr. McKenna made in explaining the Government's proposals to the House of Commons was admirably clear and of more than ordinary importance. It is reprinted in Part IV. It discloses the fact that the German Naval programme for 1909-10 has been somewhat anticipated. One of the ships provided for in the Estimates for 1909-10 had, Mr. McKenna stated, been already laid down.

Assuming that the Government's programme is carried into effect, and that the Admiralty estimates of rates of construction are realised, four ships must be added to the figures given for Britain in the above table for 1911 and four for 1912. At the end of 1911 we shall have fifty-two battleships to fifty-two for Germany and the United States. At the end of 1912 the numbers will be fifty-six for Britain and fifty-seven for the two next strongest Naval Powers.

The discussion as to the relative value of the all-big-gun type of battleship and the battleships of which the armament includes a considerable proportion of guns of 10-in. calibre or less still continues. Germany and the United States, as well as other Powers, appear to have definitely decided to follow the British lead and adhere to the all-big-gun type of battleship. In France the question has not yet been finally decided. The following table includes battleships of the all-big-gun type as well as the Agamemnonns, the French Danton class, and the Japanese and Russian battleships, which may be considered fit to lie in line with them.

Dread-
nought
type.

	Britain.	United States.	Germany.	France.	Japan.	Russia.	Italy.
Built . .	5*	—	8†	—	—	—	—
Building .	5	6	—	6	3	2	1
Total .	10	6	8	6	3	2	1
Projected .	4	2	2	—	(?)	—	1

* Includes Temeraire, which will be completed in May.

† Includes one battleship of the 1909-10 programme already laid down.

We have fourteen battleships built, building, and projected, as against eight for the United States and ten for Germany, or a total of eighteen.

In the important debate in the House of Commons already alluded to, in which the Prime Minister, Mr. Asquith, and the Leader of the Opposition, Mr. Balfour, took part, the comparison as regards our future position in relation to Germany was practically confined to ships of the Dreadnought and Invincible types, and there was a

All-big-
gun ships
building.

wide divergence between the estimates of Mr. Balfour and those of the Government. In order to arrive at an accurate estimate as to how we are likely to stand as regards all-big-gun ships during the next three years, a list of ships of this type, built, building, and projected, with actual or probable dates of completion, is set out below :—

BRITAIN.				GERMANY.			
Programme.	—	Launched.	To be Completed.	Programme.	—	Launched.	To be Completed.
1905	Dreadnought	1906	1907	1906	Nassau . . .	March, 1908	1909
	Bellerophon	1907	1909		Westfalen . . .	July, 1908.	1909
1906	Temeraire . .	1907	1909	1907	Posen . . .	Dec., 1908.	1910
	Superb . . .	1907	1909		Rheinland . . .	Sept., 1908	1909(?)
	Collingwood	1908	1910		Ersatz Beowulf . . .		1910
1907	St. Vincent . .	1908	1910	1908	Ersatz Oldenburg . . .		1910
	Vanguard . . .	1909	1910		Ersatz Siegfried . . .		1910
1908	Neptune . . .	—	1911		Ersatz Frithjof . . .		1911
1909	4 Ships . . .	—	1911	1909	Ersatz Heimdall . . .		1911
1910	4 Ships . . .	—	1912		Ersatz Hildebrand . . .		1911
	Indomitable	1907	1908	1910	3 Ships . . .		1912
1906	Inflexible . .	1907	1908	1907	Vonder Tann(ex F) . . .	1909 . .	1910
	Invincible . .	1907	1909	1908	G		1910
1908	Indefatigable	—	1911	1909	H		1911
				1910	I		1912

Future
position.

If the above estimates as to the dates of completion are realised,* the position at the end of 1909 and the three subsequent years will be as follows :—

—	BRITAIN.			GERMANY.		
	Dreadnoughts.	Indomitables.	Total.	Nassau.	F, G, H, &c.	Total.
1909 (end) . .	4	3	7	3	—	3
1910 (to be completed) }	3	—	3	4	2	6
1910 (end) . .	7	3	10	7	2	9
1911 (to be completed) }	5	1	6	3	1	4
1911 (end) . .	12	4	16	10	3	13
1912 (to be completed) }	4	—	4	3	1	4
1912 (end) . .	16	4	20	13	4	17

The above figures are practically the same as those given by the First Lord of the Admiralty to the House of Commons.

* Admiral von Tirpitz estimates a slower rate of construction; but the above estimates can be realised if German policy demands it.

Mr. Balfour's estimate that twenty-one Dreadnoughts or Invincibles would be ready in 1912 appears to have been based on the hypothesis that four ships will be so anticipated in date of commencement, or accelerated in rate of construction, as to be completed by the year named. The figures here given are sufficiently significant; they show that the margin in our favour for the next three years will be exceedingly small. But the most serious factor in the whole situation is the statement of the First Lord that at least one battleship was laid down by Germany for which no provision was made in the Estimates of last year.

In armoured cruisers we have an overwhelming superiority, as already pointed out. Only Germany is at present building cruiser-battleships of equal power to the Indomitables, though the Russian Rurik and the Japanese Ikoma and Ibuki types are very powerful ships. Neither in the United States nor in France are any armoured cruisers included in the new programme, while Italy has four ships of moderate displacement completing or under construction.

We have frequently called attention in these pages to the need of cruisers of moderate size for the protection of our world-wide commerce. Little information has been published as to five of the six cruisers laid down before March 31st, 1909, and four of the six cruisers to be laid down in 1909-10, to which allusion was made in the previous chapter, but "they will have such sea-keeping qualities and radius of action as will enable them to be employed if required in distant service."

In the Comparative Tables of Torpedo Flotillas, which are given for the first time, and which include destroyers, torpedo-boats, and submarines or submersibles, only destroyers of over 300 tons displacement are reckoned as destroyers. This line of division relegates practically all the destroyers of the Ardent type which were launched in 1893-5 to the torpedo-boat list, while all French and German destroyers, or division boats, keep their place in the list of destroyers. For the ten years 1898-1908 there was no great increase in the dimensions of this type of vessel, the destroyers built for Great Britain, France, Germany, Japan, and Russia, during these years ranging from 300 to 400 tons. But while the destroyers built in Japan since the Russo-Japanese War, and launched from 1905 to 1908, do not exceed 400 tons displacement, there has been since 1903 a rapid increase in the size of so-called destroyers built in Great Britain and Germany. The British River class, launched in 1903-5, of 530-640 tons displacement, have grown into the 800-900 tons of the Afridi class (launched in 1907), and the 900-1000 tons of the Nubian, Zulu, etc. (launched in 1908). The modern British torpedo-

Armoured
cruisers.

Second-
class
cruisers.

Torpedo
flotillas.

boat destroyer is thus considerably larger than the old torpedo gun-boat, with the exception of the Halcyon class, which were too slow for the purpose for which they were built. The largest German destroyers are of 670 tons, while the latest French boats are of about 700 tons displacement. The British boats * possess a considerable advantage, in speed, in armament, and in sea-keeping qualities, over their immediate predecessors, and over most of the destroyers built or building for foreign navies. Our superiority in this class is therefore greater than appears from the figures given in the tables. On the other hand, it may be doubted whether it is advisable to spend so large a sum on vessels which have little fighting capacity.

In torpedo-boats the superiority as regards numbers rests with France, but the present position of the French Navy as regards capital ships shows how unsound has been the policy of devoting so large a proportion of the sums available for new construction to subsidiary purposes. As regards submarines, France has taken the lead, but owing to the length of time occupied in construction we are rapidly catching her up as regards completed boats. In Germany, only two submarines are completed, and six under construction, though a large expenditure on submarines is proposed for 1909. Germany has hitherto concentrated her efforts on the building of capital ships, and hence the important position which she now occupies amongst the navies of the world.

Naval
expen-
diture.

New tables, showing the total Naval expenditure and the expenditure on new construction for the principal Naval Powers, have been compiled from the return presented to Parliament in July, 1908. The significant feature of these tables is the fact that for the year 1908 the amount voted for new construction in Great Britain, Germany, and the United States was approximately the same, and that whereas in Germany in 1908 roughly one half of the total Naval expenditure was available for new construction, in the United States less than one-third and in Great Britain just over one-fourth of the total Naval expenditure was similarly available. In making such a comparison it must always be borne in mind that British Naval Votes are charged with interest and sinking fund on loans, pensions, retired pay, etc., which in Germany are not charged in the Navy Estimates. The First Lord calculates that for the reason just given, and owing to the high pay necessitated by voluntary service, £9,000,000 should be deducted from the British Navy Estimates to make the comparison a fair one. One-third (instead of one-fourth)

* Official particulars of the destroyers of the 1908-9 programme are not available, but it is understood (as already stated in Chapter I.) that the trial speed is reduced to 27 knots.

of our total Naval expenditure may be taken as available for new construction as compared with one-half in Germany. We have often alluded in these pages to the fact that the maintenance of so large a proportion of our available ships in full commission imposes a very heavy burden on Naval votes. It has been for some years past the accepted policy of the Admiralty to keep the Fleet in a state of immediate preparedness for war, and there are very strong arguments in favour of this policy. On the other hand, it has the inevitable consequence of reducing the proportion of the total sum voted for the Navy which is available for new construction.* In 1908, the expenditure on new construction in Germany and the United States taken together amounted to £16,165,253, while the amount voted for new construction in Great Britain was £8,660,202.

To keep our new construction up to the rate required for the maintenance of the two-Power standard, and at the same time to carry out our present naval policy of having our Fleet in a state of immediate preparedness for war, imposes a burden on the resources of the United Kingdom which they are not able to bear. If our naval supremacy is to be maintained, the resources of the whole Empire must be drawn upon for the support of the Imperial Navy.

* The number of battleships in full commission will be reduced by four as compared with previous years.

TABLE IV.—SECOND-CLASS CRUISERS.

GREAT BRITAIN.			UNITED STATES.			GERMANY.			FRANCE.			JAPAN.			RUSSIA.			ITALY.		
Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.
25.	<i>Arcturion</i> ...	tons. 22.8	21.	Columbia ...	tons. 5,968	21.	Kaiserin Augusta ...	tons. 5,968	21.	Desaix ...	tons. 4,760	23.	Chitose ...	tons. 4,760	18.	Pamyat Azova ...	tons. 6,734	20.	Carlo Alberto ...	tons. 6,396
25.	<i>Gloucester</i> ...	4,800	23.	Minneapolis ...	7,375	19.	Freya ...	5,569	21.	Dupleix ...	7,578	23.	Kasagi ...	5,416	20.	Aurora ...	6,731	20.	Vettor Pisani ...	4,511
25.	<i>Liverpool</i> ...	7,700	21.	Olympia ...	5,870	19.	Hertha ...	5,569	20.	Kléber ...	6,830	23.	Soya ...	6,500	20.	Diana ...	6,630	19.	Marco Polo ...	4,511
19.	<i>Crescent</i> ...	7,700				19.	Victoria Louise ...	5,791	19.	Dupuy de Lôme ...	6,874	20.	Taiguan ...	6,830	23.	Aakold ...	5,905			
20.	<i>Edgar</i> ...	7,350				19.	Hansa ...	5,791	23.	Guichen ...	7,995				23.	Bogatyr ...	6,448			
19.	<i>Gibraltar</i> ...	7,700				19.	Vineta ...	5,791	23.	Châteaurenault ...	7,898				23.	Kagal ...	6,448			
20.	<i>Grafen</i> ...	7,350							18.	Brux ...	4,735				23.	Ochakoff ...	6,448			
19.	<i>Hawke</i> ...	7,700							18.	Charner ...	4,702				23.	Oleg ...	6,475			
19.	<i>Royal Arthur</i> ...	7,700							18.	Latouche-Tréville ...	4,831									
20.	<i>Thetis</i> ...	7,350							19.	Pothuan ...	5,374									
18.	<i>Dido</i> ...	5,606							23.	Jurien de la Gravière ...	5,595									
18.	<i>Eclipse</i> ...	5,606																		
18.	<i>Jas</i> ...	5,606																		
18.	<i>Junio</i> ...	5,606																		
18.	<i>Minerva</i> ...	5,606																		
18.	<i>Talbot</i> ...	5,606																		
19.	<i>Venus</i> ...	5,750																		
19.	<i>Arrogant</i> ...	5,750																		
19.	<i>Furious</i> ...	5,750																		
19.	<i>Vindictive</i> ...	5,750																		
20.	<i>Hermes</i> ...	5,600																		
20.	<i>Highflyer</i> ...	5,600																		
20.	<i>Hyacinth</i> ...	5,600																		
21.	<i>Challenger</i> ...	5,880																		
21.	<i>Encounter</i> ...	5,880																		
20 ships.*		186,040	3 ships.		20,620	6 ships.		34,245	12 ships.		78,541	4 ships.		25,306	9 ships.		52,610	3 ships.		17,308

* Four projected.

TABLE IV.—SECOND-CLASS CRUISERS.

GREAT BRITAIN.			UNITED STATES.			GERMANY.			FRANCE.			JAPAN.			RUSSIA.			ITALY.		
Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.
24.	Arcton	tons.	22.8	Columbia	tons.	21	Kaiserin Augusta	tons.	21	Desaix	tons.	22	Chitose	tons.	18	Pamiat Asova	tons.	20	Carlo Alberto	tons.
25	Glasgow	4,500	23	Minneapolis	5,375	19½	Gustav	5,956	21	Dupleix	5,578	23	Kasagi	6,731	20	Aurora	6,731	20	Victor Pisani	6,396
25	Glasgow	4,500	23	Minneapolis	5,375	19½	Freya	5,956	21	Kieper	5,578	23	Soya	6,600	20	Diana	6,600	19	Marco Polo	4,511
25	Liverpool	4,500	21½	Olympia	5,375	19½	Hertha	5,956	20	Dupuy de Lôme	6,676	20	Taigaru	6,630	23	Ankold	5,905			
19½	Newcastle	7,700	19½	Orizaba	7,700	19½	Victoria Louise	7,700	19	D'Entrecasteaux	7,995	23	Bogaty	8,645	23	Bogaty	8,645			
20	Edgar	7,350	19½	Orizaba	7,700	19½	Hansa	7,700	23	Guichen	8,161	23	Châteaurenault	7,898	23	Kagel	8,645			
20	Edgar	7,350	19½	Orizaba	7,700	19½	Hansa	7,700	23	Guichen	8,161	23	Châteaurenault	7,898	23	Ochakov	8,645			
20	Gibraltar	7,700	19½	Orizaba	7,700	19½	Vineta	7,700	19	Brul	4,735	18	Charner	4,762	23	Oleg	8,675			
20	Hawke	7,350	19½	Orizaba	7,700	19½	Vineta	7,700	18	Charner	4,762	18	Latouche	4,681						
20	Royal Arthur	7,700	19½	Orizaba	7,700	19½	Vineta	7,700	18	Charner	4,762	18	Latouche	4,681						
20	Thetis	7,350	19½	Orizaba	7,700	19½	Vineta	7,700	18	Charner	4,762	18	Latouche	4,681						
19½	Diana	7,350	19½	Orizaba	7,700	19½	Vineta	7,700	18	Charner	4,762	18	Latouche	4,681						
19½	Dido	7,350	19½	Orizaba	7,700	19½	Vineta	7,700	18	Charner	4,762	18	Latouche	4,681						
19½	Doris	7,350	19½	Orizaba	7,700	19½	Vineta	7,700	18	Charner	4,762	18	Latouche	4,681						
19½	Eclipse	7,350	19½	Orizaba	7,700	19½	Vineta	7,700	18	Charner	4,762	18	Latouche	4,681						
19½	Iris	7,350	19½	Orizaba	7,700	19½	Vineta	7,700	18	Charner	4,762	18	Latouche	4,681						
19½	Juno	7,350	19½	Orizaba	7,700	19½	Vineta	7,700	18	Charner	4,762	18	Latouche	4,681						
19½	Mimosa	7,350	19½	Orizaba	7,700	19½	Vineta	7,700	18	Charner	4,762	18	Latouche	4,681						
19½	Minerva	7,350	19½	Orizaba	7,700	19½	Vineta	7,700	18	Charner	4,762	18	Latouche	4,681						
19½	Talbot	7,350	19½	Orizaba	7,700	19½	Vineta	7,700	18	Charner	4,762	18	Latouche	4,681						
19½	Venus	7,350	19½	Orizaba	7,700	19½	Vineta	7,700	18	Charner	4,762	18	Latouche	4,681						
19½	Venus	7,350	19½	Orizaba	7,700	19½	Vineta	7,700	18	Charner	4,762	18	Latouche	4,681						
19	Arrogant	5,750	19	Furius	5,750	19	Furius	5,750	19	Pothuan	5,374	23	Jurien de la Gravière	5,595						
19	Furius	5,750	19	Furius	5,750	19	Furius	5,750	19	Pothuan	5,374	23	Jurien de la Gravière	5,595						
19	Vindictive	5,750	19	Vindictive	5,750	19	Vindictive	5,750	19	Pothuan	5,374	23	Jurien de la Gravière	5,595						
20	Hermes	5,600	20	Hermes	5,600	20	Hermes	5,600	20	Hermes	5,600	20	Hermes	5,600						
20	Highflyer	5,600	20	Highflyer	5,600	20	Highflyer	5,600	20	Highflyer	5,600	20	Highflyer	5,600						
20	Hyacinth	5,600	20	Hyacinth	5,600	20	Hyacinth	5,600	20	Hyacinth	5,600	20	Hyacinth	5,600						
21	Challenger	5,800	21	Challenger	5,800	21	Challenger	5,800	21	Challenger	5,800	21	Challenger	5,800						
21	Kuoninger	5,800	21	Kuoninger	5,800	21	Kuoninger	5,800	21	Kuoninger	5,800	21	Kuoninger	5,800						
20 ships.*		180,000	3 ships.		20,620	6 ships.		24,245	12 ships.		76,841	4 ships.		25,306	9 ships.		52,610	3 ships.		17,408

* Four projected.

TABLE V.—THIRD-CLASS CRUISERS.

GREAT BRITAIN.			UNITED STATES.			GERMANY.			FRANCE.			JAPAN.			RUSSIA.			ITALY.		
Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.
18½	Amethyst...	3,000	18½	Detroit ...	2,089	20	Gefion ...	3,712	20	Davout ...	3,031	20	Akashi ...	2,657	19	Almaz ...	3,283	17	Vesuvio ...	3,273
22	Diamond ...	3,000	18½	Marblehead ...	2,089	20	Irene ...	3,712	20	Linois ...	2,306	20	Suma ...	3,150	23	Jemchug ...	3,106	18	Kina ...	3,470
22	Sappho ...	3,000	19	Montgomery ...	3,467	19	Wilhelm ...	4,233	20	Gallice ...	2,316	19	Atsuhshima ...	3,150	17			17	Piemonte ...	2,536
22	Topaze ...	3,000	20	Albany ...	3,467	21	Gazelle ...	2,603	20	D'Estrees ...	2,421	17	Hiyodra ...	3,150	21			21	Stromboli ...	2,697
19½	Astrea ...	3,000	20	New Orleans ...	4,413	21	Niobe ...	2,603	20	Infarnet ...	2,436	18½	Tokushima ...	3,700	18			18	Calabria ...	2,498
19½	Cambrian ...	3,000	18	Chicago ...	5,273	21	Medusa ...	4,313	19	Alger ...	4,406	18½	Naniwa ...	3,700	17			17	Edo ...	2,690
19½	Flora ...	3,000	19	Newark ...	4,098	21	Nymph ...	2,618	19	Iely ...	4,406	20	Nitaka ...	3,365	17			17	Giovanni Paisano ...	3,277
19½	Fort ...	3,000	19½	San Francisco ...	3,213	21	Amazon ...	2,618	19½	Chase-loup ...	3,824	20	Tsushima ...	3,365	18			18	Stirling ...	2,245
19½	Fox ...	3,000	19	Cincinnati ...	3,213	21	Ariadne ...	2,618	19½	Laubach ...	3,824	20	Tsushima ...	3,365	18			18	Liguria ...	2,245
19½	Hermione ...	3,000	21½	Atlanta ...	3,213	21½	Tufts ...	2,657	19½	Friant ...	3,851	25	Susuya ...	3,000	18			18	Umbria ...	2,351
19½	Brilliant ...	3,000	21½	Raleigh ...	3,750	21½	Frauenlob ...	2,657	19½	Pacal ...	3,970	23	Yone ...	4,035	20			20	Lombardia ...	2,498
19½	Indefatigable ...	3,600	24	Birmingham ...	3,750	21½	Arcana ...	2,657	19	Decartes ...	3,970	23	A ...	4,035						
19½	Chesler ...	3,600	21½	Salem ...	3,750	21½	Undine ...	2,657	19	Cassard ...	3,970	23	B ...	4,035						
20	Latona ...	3,400	23			23	Hamburg ...	3,890	19	Du Chayla ...	3,962	23								
20	Sappho ...	3,400	23			23	Berlin ...	3,890	19	Catinat ...	4,048	23								
20	Scylla ...	3,400	23			23	Munchen ...	3,200	19	Protet ...	4,001									
20	Sirtis ...	3,600	23			23	Lubeck ...	3,200												
20	Terpsichore ...	3,400	23			23	Leipzig ...	3,346	20½	Cormo ...	1,923									
20	Phaeton ...	2,575	23			23	Danzig ...	3,346	20½	Forbin ...	1,935									
20½	Pelorus ...	2,575	23½			23½	Königsberg ...	3,396	20½	Lalande ...	1,968									
20	Proserpine ...	2,135	23½			23½	Stuttgart ...	3,396	20½	Surcouf ...	2,012									
20	Pegasus ...	2,135	24			24	Settin ...	3,544												
20	Pomona ...	2,135	24			24	Euden ...	3,544												
20	Pandora ...	2,200	24			24	Dresden ...	3,544												
20	Phoebe ...	2,200	24			24	Kollern ...	4,232												
25	Reliance ...	3,300	25			25	Mining ...	4,281												
25	Endeavour ...	3,300					Kraatz Schwallbe ...	4,281												
							Kraatz Sperber ...	4,281												
33 ships. ^a		102,765	14 ships. ^b		46,799	30 ships. ^c		99,493	21 ships.		66,773	18 ships.		51,768	2 ships.		6,991	13 ships.		36,799

† 2 projected.

• 2 projected.

EFFECTIVE FIGHTING SHIPS, BUILT AND BUILDING.

Class.	GREAT BRITAIN.			UNITED STATES.			GERMANY.			FRANCE.			JAPAN.			RUSSIA.			ITALY.		
	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.
BATTLESHIPS:—																					
Modern ...	43	5	48	21	6	27	20	10	30	9	6	15	10	3	13	3	4	7	5	2	7
Older... ..	13	—	13	4	—	4	4	—	4	9	—	9	2	—	2	5	—	5	5	—	5
Total ...	56	5	61	25	6	31	24	10	34	18	6	24	12	3	15	8	4	12	10	2	12
CRUISERS:—																					
1st Class ...	48	1	49	15	—	15	8	4	12	13	2	15	11	2	13	4	2	6	4	3	7
2nd Class ...	25	5	30	3	—	3	6	—	6	12	—	12	4	—	4	8	—	8	3	—	3
3rd Class ...	30	2	32	14	—	14	26	4	30	21	—	21	13	2	15	2	—	2	13	—	13
Total ...	103	8	111	32	—	32	40	8	48	46	2	48	28	4	32	14	2	16	20	3	23

TORPEDO FLOTILLAS.

Class.	GREAT BRITAIN.			UNITED STATES.			GERMANY.			FRANCE.			JAPAN.			RUSSIA.			ITALY.		
	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.
DESTROYERS ..	112	24	136	17	15	32	80	24	104	54	21	75	55	—	55	81	5	86	14	6	20
TORPEDO BOATS—																					
1st Class ..	64	6	145	35	—	35	74	—	74	264*	—	264	82	—	82	101	—	101	91	—	91
Older Types..	75	—																			
SUBMARINE BOATS ..	44	21	65	12	16	28	2	6	8	54†	51	105	7	5	12	24	12	36	6	1	7

* According to M. Chaumot about 100 of these are ineffective.

† Several of these are also considered by M. Chaumot to be ineffective.

TOTAL NAVAL EXPENDITURE.

—	Great Britain.	Germany.	United States.	France.	Japan.	Russia.	Italy.
	£	£	£	£	£	£	£
1900	29,998,529	7,648,781	13,385,574	12,511,053	—	8,662,801	4,903,129
1901	30,981,815	9,590,333	16,012,438	13,107,701	—	9,359,766	4,912,661
1902	31,008,977	10,044,081	16,203,916	12,271,948	—	10,446,392	4,840,000
1903	35,709,477	10,401,174	16,824,058	12,538,861	—	12,349,567	4,840,000
1904	36,859,681	10,102,740	20,180,310	12,513,143	—	11,949,906	5,000,000
1905	33,151,841	11,301,370	24,444,948	12,747,963	—	12,392,684	5,040,000
1906	31,472,087	12,005,871	21,358,199	13,003,238	3,952,311	12,490,444	5,322,154
1907	31,419,500	13,623,924	21,260,732	12,486,793	3,248,222	8,850,240	5,661,822
1908	32,319,500	16,596,561	25,833,217	12,797,308	3,094,884	9,833,915	6,266,193
1909	35,142,700	19,594,566	28,138,261	13,353,824	7,490,000	—	6,885,440

AMOUNT VOTED FOR NEW CONSTRUCTION.

The Actual Expenditure for Great Britain is shown in Italics.

	Great Britain.	Germany.	U. States.	France.	Japan.	Russia.	Italy.
	£	£	£	£	£	£	£
1900	9,788,146 <i>(10,025,551)</i>	3,401,907	4,344,127	4,718,566	...	3,149,014	1,156,921
1901	10,420,256 <i>(10,841,780)</i>	4,921,036	5,219,357	4,990,987	...	3,068,139	1,083,921
1902	10,436,520 <i>(9,782,217)</i>	5,039,725	4,701,121	5,389,383	...	2,904,096	1,254,787
1903	11,473,030 <i>(12,399,133)</i>	4,929,110	5,327,367	5,722,760	...	3,268,755	1,183,338
1904	13,508,176 <i>(13,184,419)</i>	4,644,862	6,539,990	5,636,732	...	4,480,188	1,121,753
1905	11,291,002 <i>(11,368,744)</i>	4,968,738	11,374,876	5,739,280	...	4,576,370	1,714,556
1906	10,859,500 <i>(10,436,397)</i>	5,842,466	8,600,774	5,702,267	752,595	4,576,583	1,362,207
1907	9,227,000 <i>(9,166,876)</i>	6,285,225	6,783,705	5,132,494	3,233,298	2,846,268	1,398,111
1908	8,660,202	8,366,438	7,798,815	5,315,790	2,967,918	2,703,721	1,866,358

CHAPTER IV.

DOCKYARD ADMINISTRATION : PAST AND PRESENT.

I.

Histori-
cal.

IN England, down to the reign of Henry VII., the construction and repair of vessels was apparently in private hands or those of guilds or corporations. At this period the substantial increase in the size of ships, due to the development of sail power, rendered it no longer possible to carry out repairs by the primitive methods of beaching or the use of temporary mud docks, as the Chinese do with their junks to this day, and it became necessary to provide permanent dry docks. As increase of size first took place in fighting ships, the Government had to take the matter up, the first dry dock in the United Kingdom being constructed at Portsmouth in 1495, from which date the dockyard there may be said to have come into existence, though its establishment as a Royal Dockyard is usually attributed to Henry VIII. It is not easy to determine with accuracy when the several Royal Dockyards were established, as many years elapsed between their projection and completion, but their dates may be taken to be approximately as follows:—Portsmouth, 1495 (as stated above); Woolwich, shortly after 1495; Chatham, 1510; Deptford, 1513; Devonport, 1691; Sheerness, 1712 (projected in 1665); Pembroke, 1812, in succession to a small yard at Milford which had been rented by the Admiralty a few years earlier. Haulbowline as a Naval Establishment (in succession to one at Kinsale) was authorised in 1806; but until recently it had few pretensions to be classed as a dockyard, for although a dry dock was projected in 1864, it was not until 1895 that steps were taken to obtain machinery to carry out repairs to ships. Its first Chief Engineer was appointed in 1898, and its first Constructor in 1900. Woolwich and Deptford were closed in 1869, in pursuance of the recommendations of a Select Committee of the House of Commons, the former yard being handed over to the War Office, and part of the latter retained as a Victualling Yard and Naval Store Dépôt. Deptford still exists as a Victualling Yard, but the Naval Store Dépôt has been removed to the West India Docks.

Just as the original cause which brought these organisations into being was the development of sail power, accompanied by the growth

in size of hulls, so did the revolutionary conditions of steam propulsion again lead to increase in size and power, and necessitate dockyard extensions. The original steam basin and factory at Portsmouth was completed in 1848, and the existing docks and basins in 1881, and they are being constantly added to. The Keyham basins and docks were opened in 1857. At Chatham the new basins and docks were officially opened in 1885, though they had been partially brought into use some years earlier. These dates are important since they bring us to the modern era of the Royal Dockyards. Industrial and mechanical advance, under which wood gave way to iron, and iron gave way to steel, followed by the inevitable increase in the size of ships, culminating in the advent of the Dreadnought type, has necessitated another epoch of dockyard extension. The extension of the Devonport (North) Yard, opened in 1907, has made that yard capable of efficiently dealing with the Dreadnought class; but so far as the other Home Yards are concerned, we are in no better position than our neighbours to deal with this large type in a dockyard sense. Chatham has been outclassed; it has become necessary to spend close upon £1,000,000 at Portsmouth for the construction of a lock to enable the improved types of ships to gain access to the one dock capable of receiving them; whilst at Rosyth at present but one dock is proposed. It follows, therefore, that the increase of size embodied in the Dreadnought and her larger successors must lead to a still further increase of docking facilities, either in the dockyards or by subvention of private docks. The choice of position of all these yards was due to the political strategical conditions which until now have continued since their foundation, and which were governed by the necessity of our command of the narrow seas, and to the geographical conditions of available ports, with the exception of Pembroke, which was established on the recommendation of Nelson on the suggestion of the Grevilles, who owned the adjoining property.

A perusal of Pepys' "Memoires," of the reports of the many Commissions and Committees which have inquired into matters of dockyard administration from his day to this, and of dockyard records and correspondence, shows that these establishments were always a difficulty of Admiralty administration, varying with, and improving only slowly behind, the moral, social, and industrial conditions of the community. Each report is almost identical in exposure of the abuses and inefficiency, which have been modified only in degree, though the corruption which was so prominent a feature of their early days, and which prevailed to a less extent down to the middle of the last century, no longer exists.

Abuses.

Reforms.

The first great reformer was Samuel Pepys, who came into touch with the Navy in 1660, and through whose efforts, particularly from 1673 to 1689, so much was done to place the Navy and the dockyards in an efficient state. After him nothing much appears to have been done until Lord Anson became First Lord of the Admiralty, 1747-59, when he undertook the reform of the Royal Dockyards, and did much to improve their administration: though not so bad as before, there is no doubt that they remained exceedingly corrupt for many years. It was not until St. Vincent's time, 1801-4, that a real reform was attempted, when by Act of 43 George III. two Commissions were appointed, one "to inquire into Irregularities, Frauds, and Abuses which have been practised" in the several Naval Departments therein mentioned, and in the business of Prize Agency, "and to report what shall occur to them for preventing such, and better conducting and managing the business of said Departments"; the other for "Revising and Digesting the Civil Affairs of His Majesty's Navy." The former issued no less than fourteen reports between 1803 and 1806, embracing, amongst other questions, the conduct of the Home and Foreign Dockyards; and it is interesting to note the evidence and their remarks on the abuses of overtime, Admiralty mismanagement, and the waste and loss of labour which took place—evils which even now have not been eradicated. The latter issued thirteen reports between 1806 and 1807, embodying instructions in all details for the conduct of the Home, Foreign, and Small Yards, and it is amusing to note that they state that the existing instructions for the latter dated from the reign of William and Mary, as did the First Commission on those of the Foreign Yards, which stated that the instructions for their guidance were so old and so full of appendices that no one could interpret them, and that this was one great cause of laxity. The second Commission also issued new instructions for the Hospitals, Victualling and Transport Offices, and apparently all the departments reported on by the first. The return in chronological order of all inquiries into naval and military affairs since the year 1800, and of all reports that have been published—asked for by Lieutenant Bellairs, R.N., and printed by order of the House of Commons, October 12, 1908—shows that although something was done by Sir James Graham in 1832, mainly affecting the Admiralty, the dockyards were allowed to rest for the next fifty years, and that it was not till 1858 that an Admiralty Committee on Dockyard Economy was appointed, followed in 1860 by a Royal Commission on the Control and Management of Her Majesty's Naval Yards. The former reported at length on a large number of points; whilst the latter brought about many reforms, principally of a

financial order. It was only in 1862, as a result of these reforms, that the Admiralty issued a minute, expressing satisfaction that the manufacturing accounts presented by the Accountant-General (Sir R. Bromley) was the first and most important step towards a complete and accurate system of dockyard accounts.

In 1869 changes were effected in the business of the Admiralty, and in 1873 a Committee was formed for the Audit of Navy Accounts, only indirectly affecting the dockyards. In 1877 an Admiralty Committee reported on the system under which the duties of the Stores Department of the Royal Navy are conducted, the result of which was to establish the Naval Store Department much on its present basis. In 1884-5, a Committee on Contracts for the Building and Repair of Ships, and Repairs and Refits effected in the Dockyards, reported against putting ships out for repair by contract, on account of the greatly increased cost, and against the loss and waste incurred by stripping ships and clearing them out of stores, most of which were condemned, though not worn out, after only one commission. This led to the practice of recommissioning ships on foreign service, but the great waste and loss in stripping and returning stores was not stopped till 1904. This Committee reported that over-centralisation at the Admiralty as regards details and in regard to refits, as well as the want of adoption of modern appliances and the obsolete character of the dockyard tools, were causes of inefficiency. The latter was not remedied fully until 1905. The Admiralty policy in regard to up-to-date machinery has since been a liberal one, the most notable feature being the establishment of central electric power stations.

Stores and
contracts.

It was not till 1885-7, after a lapse of twenty-five years, that the question of dockyard administration was really taken up again. Several Committees were instituted by Lord George Hamilton, when First Lord, to inquire into Admiralty and dockyard administration and expenditure. The principal one was that known as Graham's Committee, of which Vice-Admiral Graham, C.B., Controller of the Navy, was chairman, Mr. Robert Main, Principal Clerk of the Accountant-General's Department, Mr. G. H. Stainer, Constructor and Assistant Surveyor of Dockyards, were members, and Mr. Gordon Miller, then of the Transport Department, and who eventually became Accountant-General of the Navy, was secretary. Their directions were to inquire into the indirect or incidental and establishment charges at Her Majesty's Dockyards, etc., the scope of which, after their first report, was extended to the following subjects:—

Graham's
Com-
mittee.

- (a) Supervision of labour ;
- (b) Distribution and supervision of materials for ships and services ;

- (c) Accounts, audits, and returns ;
- (d) Organisation and distribution of clerical staff; and
- (e) Generally to offer any suggestions in the direction of securing an economical use of labour and materials in Her Majesty's Dockyards.

The reports of this Committee form the high-water mark of inquiry into dockyard administration, a large part of the credit for which should be attributed to Admiral Graham and the late Sir Gordon Miller. They assign the principal causes of the defects in the dockyard system to want of effective management, and state that the superintendence was so restricted as practically to make the officer who exercised it merely a channel of communication between the Admiralty and his officers ; and that though an alteration in management was absolutely essential, its application would be of little service unless the central control or management of the dockyards was considerably strengthened and improved. They report on the want of any systematic or concurrent financial control, on the obsolete character and insufficiency of the yard machinery, on the rigid adherence to obsolete instructions (as did the Commissions of 1803–7), on the duplication of accounts, on the especially defective system of audits, on the detention of the principal and other officers by matters of routine in their offices, instead of being amongst their workmen, and on other points too numerous to mention.

Ritchie's
Com-
mittee.

The two reports of the Committee of which Mr. C. T. Ritchie was chairman, "to consider what new rules and alterations in the present system of conducting business at the Admiralty are necessary to ensure an effective control over the expenditure of the different departments," were contemporaneous. They reported that they concurred with the report of the Select Committee of the House of Commons on Admiralty liabilities, which stated that "the entire absence of financial control which the evidence discloses cannot be justified," and they recommended the enlargement of the functions of the Accountant-General in their first report. In their second report, dated November 16, 1885, their recommendations, amongst others, were to abolish the office of Surveyor of Dockyards and substitute the office of Director of Dockyards, to appoint civil assistants to the dockyards, to abolish the post of accountant, and to separate the examination of accounts from their preparation. Such recommendations as were adopted were embodied in an Order in Council of November 18, 1885, and an Admiralty Memorandum, dated December 10, 1885.

1885
reforms.

A Committee and several Sub-Committees were appointed by the Admiralty on December 15, 1885, to consider various matters con-

nected with the management of the Royal Dockyards. Their reports, together with the Admiralty minutes and letters thereon, applied many of the reforms advocated, and placed the dockyards on a sounder basis than they had ever been before. They constitute the basis of the present system of administration, though they have not succeeded in eliminating all the defects and deficiencies pointed out in the two main reports, nor fulfilled all their expectations, for many of the weak spots remain in modified form much as they were.

Having effected these reforms, a period of rest of nearly twenty years supervened, and it was not until 1903 that questions connected with dockyard administration again came to the front. A summary of some of the alterations carried out is given in a Statement of Admiralty Policy presented to both Houses of Parliament by Lord Cawdor, dated November 30, 1905. These consisted in the abolition of the civil technical assistants, as they had then become, making the chief constructors and chief engineers "managers" (an alteration of shadow rather than substance), a change in the position of the Director of Dockyards (it is doubtful whether the effect intended has been secured), and some improvement in regard to stores. All these minor changes dealt only with detail; they in no sense affected principles, which have remained as they were left by the reforms of 1885-7. To the changes enumerated in this Statement may be added the abolition of the Dockyard Reserve as it had previously existed, which, of all the alterations effected, was the most practically efficient.

The last Committee was the Naval Establishments Committee of 1905, of which Admiral of the Fleet Sir John Fisher was chairman. The three principal dockyards and their allied establishments were visited by the Committee, as were the smaller ones and some of the private shipbuilding yards by some of its members. No witnesses were called, and the report, which was confidential, has not been promulgated. A second Committee was formed to report on the separation of dockyard materials from ships' sea (equipment) stores, and a non-confidential report on this subject was issued by the Naval Establishments Committee. The Admiralty Orders and Memoranda, issued during the latter part of 1905, related to shipbuilding policy, reduction of numbers in the dockyards, placing the Victualling, Naval Ordnance, and Fleet Coaling Services under the Admiral-Superintendent, abolishing civil technical assistants, making the heads of the constructive and engineering departments managers of their departments, and altering the constitution of the office of Director of Dockyards, in an endeavour to enable him to more constantly visit the yards and confer with the superintendents and officers in regard to dockyard work, organisation, and equipment. Orders were also issued

Naval
Establish-
ments
Com-
mittee,
1905.

dealing with contracts for materials, reserve stocks, storage of naval stores, and extension of the "present use" system—all, with the exception of the two first heads, being attempts to carry out the intentions of the 1885-6 reports.

Alterations of detail in accounts.

The last circular issued, dated November 2, 1908, dealt with the preparation of expense accounts of ships and services, comparison of expenditure upon ships, etc., with approved estimates, accounts of manufacturing workshops, wages returns, allocation of wages, etc., estimates of dockyard work locally approved, accumulation of materials in workshops, etc. In no sense can it be said that the changes were organic in an administrative sense; they were alterations, some of which were good and some of a reactionary tendency. Many of the proposals and suggestions made at this period have not been carried out.

This review of the history of dockyard administration unmistakably shows that Admiralty reforms, instead of being continuous, are periodic, with a regular interval of almost exactly fifty years, for it cannot be said that the reforms of 1832, or even those of 1885-7 and since, were organic; they were attempts to put in order existing principles, and improve working details.

II.

Local administration.

Thus far we have been reviewing on broad, general lines the evolution of Admiralty administration of the Royal Dockyards. We will now deal with the local administration of these establishments, which, interdependent though it naturally is upon the policy at Whitehall, is yet a distinctly separate organisation. Prior to 1832, the officers in charge of the dockyards were known as the Resident Commissioners. In that year the Navy Board was abolished, and the office of Superintendent was instituted, a change in name only so far as the Resident Commissioners were concerned. At that time the Superintendents were assisted by six principal officers, known as Master Attendant, Master Shipwright, Clerk of the Cheque, Store-keeper, Clerk of the Survey, and Clerk of the Rope Yard. About 1842 an Engineering Department was created, and in 1903 an Electrical Department was added. To-day the principal officers of the dockyards under the Superintendent are, in order of precedence, as follows:—

Captain of the Dockyard and Deputy Superintendent.
 Manager, Constructive Department.
 Manager, Engineering Department.

Superintending Civil Engineer (Works Department).

Electrical Engineer.

Naval Store Officer.

Expense Accounts Officer. } According to seniority in either
Cashier. } capacity.

Secretary to the Admiral Superintendent.

The Chaplain and Fleet Surgeon also take rank as principal officers.

It will afford a very fair insight into the range of local administrative functions (as differentiated from direct Admiralty administration) if we refer to the recommendations of the Committees of 1885-6. The chief clauses bearing upon this subject are :—(a) That the control exercised at the Admiralty over dockyard transactions should be strengthened from an executive as well as a financial point of view ; (b) that a system of local management should be adopted by which the Naval Superintendent shall be afforded the assistance of professional managers (as separate officers) at Portsmouth, Devonport, and Chatham ; (c) that the impediments which interfere with the proper performance of their legitimate duties by the professional officers be removed ; (d) that by a judicious selection of competent subordinate officers, provision be made for continuity of supervision or inspection of labour and work when the officers immediately in charge are otherwise engaged ; (e) that arrangements for the supply, issue, and subsequent custody of materials be improved ; and (f) that a system of independent audit be introduced. Although these recommendations did not amount to a series of organic changes, they illustrate the basis upon which local dockyard administration is built. Strictly speaking, they were amendments in the existing system, the defects of which were fully set forth in the Committees' reports. The outcome of the recommendations enumerated took the following definite shape :—(a) and (f) Controller's Department reorganised, and office of Director of Dockyards under him substituted for that of Surveyor of Dockyards ; Accountant-General's Department reorganised, and independent audit for dockyards established ; many returns abolished or simplified, and clerical staff of dockyards reorganised. (b) Civil (professional) assistants appointed to Portsmouth, Devonport, and Chatham. (c) and (d) Instructions issued to the dockyards, but of a general rather than specific character ; and (e) Contract arrangements improved, the post of Surveyor of Stores at the dockyards established, improvements instituted as regards the delivery and receipt of stores, and "present use" stores introduced. A circular was also issued to the respective Commanders-in-Chief,

Range of
local ad-
ministra-
tive
functions.

impressing upon them the necessity of ships' artificers making good such defects as they could and should do. This point still remains an ever-present difficulty, owing to the traditional desire of the Service to get as much done by the dockyards as possible.

Accounts
and
audit.

As regards the points touched upon in (a) and (f), the reforms suggested in the accounts and system of audit were put into effect, and have worked satisfactorily in practice, though it is doubtful whether the local audit, carried out under the provisions of an Act of Parliament by representatives of the Exchequer and Audit Department, possesses any value from an Admiralty point of view; but as much cannot be said for the reform of the Controller's Department in its relation to the Royal Dockyards. The institution of the office of Director of Dockyards has not been followed by the results anticipated; this officer has been associated, in an ever-increasing degree, with the Controller's Department, and the dockyards saw very little of him. Indeed, this came to be so far recognised that in 1905 an attempt was made to extend the authority of the Director of Dockyards, although it cannot be said that the effort had a wholly satisfactory result.

Other
reforms of
doubtful
order,
except
stores and
contracts.

The improvement effected in connection with (b) must also be regarded as of a doubtful order; its value depended entirely upon the individual, who was placed at a disadvantage from the fact that the departments never liked his presence, and, as a consequence, the principle was abandoned in 1905. Coming to (c) and (d), the instructions issued bore no material fruits, and though some improvement has taken place, yet the defects and inefficiencies indicated by the Committee of 1885-6 in these two paragraphs still continue to exist. With regard to (c), the Contract Department at the Admiralty is highly efficient, and its relations with the dockyards wholly satisfactory. The delivery, receipt, and custody of stores are, as far as the Naval Store Department is concerned, very efficiently organised, and the arrangement of the storehouses is very complete; but as much cannot be said regarding the issue and account of materials and stores when once they have left the Naval Store Officer's custody.

Lack of
co-ordin-
ation
between
depart-
ments.

Another point of weakness is the hereditary lack of closer co-ordination between the different departments. The Manager of the Constructive Department may be regarded as the lineal descendant of the Master Shipwright, who, in his day, was the superior and, indeed, almost the only authority in the yard. He was even the storekeeper, and it was only as late as 1876 (although the change was not simultaneous in all the dockyards) that this function was taken out of his hands. We still find remnants of the system existing, structural materials remaining in the charge of the Constructive and

Engineering Departments. The advent of the Engineering Department was attended by considerable friction, the Master Shipwright's Department resenting any usurpation of its own hitherto unchallenged supremacy; but the march of progress was too strong for the sentiment of tradition. Only lately an instance of the futility of this opposition to the inevitable course of events was afforded by the tacit but unmistakable attitude of the Constructive Department towards the newly-formed Electrical Engineer's Department. It is no mere idle figure of speech to say that both the Constructive and Engineering Departments have insufficiently recognised the need of efficient co-operation with the heads of the Civil Departments, viz., the Naval Store Officer, Expense Accounts Officer, Cashier, and Secretary, and have resisted all the efforts of these officers as an interference in the conduct of their own particular affairs. Such a condition must necessarily militate against the interests of efficiency. An example in point may be cited in the system of dealing with materials, which has never yet been established upon a really satisfactory basis. If an organisation is so extensive as to need a special department for controlling the supply of stores and materials, it follows that there should be undivided responsibility in all questions affecting custody, supply, and account; but this is not the case, and considerable loss is involved thereby.

The most noteworthy improvements, based upon the reports of the 1885-7 and 1905 Committees, relate to the conferring the title of Manager upon the Chief Constructor and Chief Engineer, with enhanced authority over their men, and an attempt to strengthen and improve the position of the Director of Dockyards. The other so-called reforms have dealt with the reduction of establishments (a policy which has since been reversed), the placing of all the Civil Establishments under the Superintendents—a step having nothing to do with dockyard administration—and the reduction of stocks that have since had to be largely replaced. A careful review of the material results of the labours of the 1885-7 Committees leads to the conclusion that these have taken the form of establishing on the paper side of finance, account, and audit, a sound, business-like system; but that, on the executive side, comparatively little has been achieved. We will now consider the reasons for this comparative failure.

Results of
1885-7
and 1905
Com-
mittees.

III.

At Devonport, in 1902, all the defects and inefficiencies enumerated in the reports of 1885-6 were still in existence. This shows that the reforms carried out were of an accountant and financial character,

System,
not indi-
viduals, at
fault.

and did not touch the executive. In stating this fact, no imputation whatever is conveyed against individuals, but rather against the system which provided accurate paper returns that could appeal only to those who were ignorant of the internal economy of the dockyards, and unable, therefore, to realise what a degree of inefficiency these hid.

Dock-
yards not
treated as
living or-
ganisms

The dockyards have never been treated as living organisms. In any industrial organisation there must be some small percentage of unavoidable waste, both of labour and materials, but all other loss is preventable, and it is the aim of every efficient organisation to reduce this to a minimum. It is only about a decade ago that our industrial leaders awoke to the fact that other nations, especially the Americans, had grasped this and set their house in order. Agents were sent to the United States to report on American business methods, with the result that no large industry is now conducted except on up-to-date conditions of organisation, mostly American in their origin. Only an echo of this economic and industrious progress has yet reached the dockyards, and the chief cause of preventable loss in them is a faulty and obsolescent administrative system which induces local inertia.

Devon-
port in
1902.

To illustrate this, it may be mentioned that in 1902 Devonport Yard possessed only two or three typewriters, only the nucleus of a telephone system, and no shorthand writers. There was no efficiently organised means of communication, either by land or by water, for the conveyance of close upon 10,000 men employed in this dockyard or the materials they used. No internal postal system existed, and fully 200 separate agencies were employing labour for the transmission of messages, notes, and books, now done by five boys and the part service of one man. All these agencies, again, supplied themselves with materials in the most primitive of fashions, instead of their being economically distributed according to modern methods. The superior and subordinate officers virtually lived in their offices, the consequence of which was that the supervision of workmen was left to the inspectors and chargemen, whose authority, being insufficient, resulted in want of proper supervision, with all the concurrent evils of idleness, waste, neglect of apprentices, and the like. Betting agencies were even in existence, and carried on during working hours. It is doubtful if there was much amelioration of the conditions disclosed by the 1885-6 Committee; waste was apparent everywhere, although in this indictment the Works Department (under Vote 10) must not be included. To show that this picture is no exaggeration, it may be mentioned that it was ascertained that an average of 1400 men were found to be journeying to and fro between

the North and South Yards daily during working hours—a number that was reduced to 200 per diem when necessary reforms were carried out. Among these reforms was the establishment of a central estimating office, the abolition of the foremen's separate offices (which released them to a large extent for their executive duties), and the establishment of "present use" stores in convenient situations in proximity to centres of work, in accordance with the recommendations of the 1885-6 Committee, under the Naval Store Officer, enabling chargemen, who are the originators of demands, to obtain their minor wants on the spot and instantly—a great advantage.

The system of administration had, indeed, converted the yard into a huge bureaucracy; it was, in consequence, almost nerveless. Real energy, initiative, or true responsibility was obliterated, and the chief aim of officials was to "save their faces" by rigid adherence to obsolete regulations, or to evade responsibility by reference to the Admiralty. Over-regulation and tradition had converted the departments into separate camps, each struggling for its own; the efficiency of the yard, as a whole, was lost sight of, and the economic loss was very great. Such reforms as were instituted had to stem the tide of this state of affairs. There has been here and there a tendency to reaction, and even now there is no attempt to apply reformed principles generally. One of the recommendations of the Committee of 1885-6 dealt with the issue and subsequent custody of materials. They also (vide p. 20 of the report) "were inclined to recommend that the professional officers should, as far as possible, be custodians of the materials required in the construction and repair of ships." This has been followed as far as constructive materials are concerned, thus maintaining the traditions of the time when the Master Shipwright and, later, the Chief Engineer were storekeepers before the Naval Store Department was properly organised and developed. At Devonport it was, and in all the other yards it still is, the custom, though partly modified at Chatham, for the executive departments to demand from the Store Officer their requirements in gross amounts, and when so supplied, all account ceased.

Adminis-
tration a
bureau-
cracy.

As a consequence of this condition of things, each foreman had to set up what may be designated an unauthorised store, into which these supplies were transferred, to be used as required. A labourer or skilled labourer was put in charge. It followed as a matter of course that, account having ceased, these stores could be, and in part were, indiscriminately used for any purpose—a point not without its facilities in having things "handy." Another consequence of this system was that demands were always made on the "safe side," and, surpluses not being taken into account, large accumulations

The
unautho-
rised
store.

occurred in these stores. When abolished at Devonport in 1904, no less than £40,000 worth of surplus material was found in them, and it is understood that material of a similar value was found at Chatham. A surplus without account is a more dangerous thing than a deficiency; the latter is sooner or later sure to be found out and brought to book, but no one troubles about a surplus—at least, in the dockyards. With such a system as this, what wonder is it that the belief still flourishes in the dockyard towns that anything could be got out of these organisations? The boast of commanders, first lieutenants, and warrant officers of ships as to how they managed to rob the dockyards is a traditional one, nor is there any doubt that they did, and still do, get a great deal out of them. This is accomplished by getting hold of surpluses unaccounted for—stores to be had literally for the asking. These foremen's stores were all done away with at Devonport, and "present use" stores, under the control and account of the Naval Store Officer, established near the centres of work in their stead. This was the means of effecting great saving; but, to be thoroughly efficient, the system of account requires to be carried a step lower into the hands of the chargeman, who is the final depository of the materials issued.

Naval
Store De-
partment.

In any organisation sufficiently large to require a separate store department for the common use of all its departments, it follows that economical efficiency can only be secured by employing such department for the receipt, custody, and issue of its materials for all purposes down to the point at which their application takes place. The stores should remain in the charge of the department until then, either directly or through its agents attached to and working executive under the direction of the several departments concerned. In many cases this latter arrangement will be found the best for economical working, and will get over the difficulties hitherto advanced by the departments. The necessity for this has already been briefly touched upon in the preceding section. The principle is that no store should be set up except under the control of the Naval Store Officer or his agents, though these latter may be attached to the departments as indicated above; only by such methods can multiplication of accounts be avoided. The result would be to release the executive principal officers and their staffs from much of the office work involved by their acting as storekeepers, and would enable the accounting system to be simplified and carried down to the point of practical application. That the existing system is unsatisfactory is well established. According to the regulations, and in theory, all surpluses should be accounted for and returned, but in practice this is seldom done.

There is no intentional misappropriation, but it is so much easier to apply surpluses than to account for them that this is generally done. Particularly so is this the case with construction. A surplus of materials demanded for one ship, and which may amount to very considerable value, will enable smaller demands to be made for the next, and it is, in consequence, impossible to aver that the comparison of expenditure on the construction of similar ships between the yards is a fair one.

The Expense Accounts Department, under the Expense Accounts Officers, maintains and keeps the whole of the accounts of the yard, including the cost of labour, the cost of materials issued to the departments, and the manufacturing accounts, and renders them to the Inspector of Dockyard Expense Accounts in the Controller's Department at the Admiralty. After being embodied and subjected to the audit of the Comptroller and Auditor-General, these are submitted with his report annually to the House of Commons, in accordance with the Army and Navy Audit Act of 1889.

Expense
Accounts
Depart-
ment.

This system of dockyard accounts was an outcome of the 1885-7 reports. There was no independent audit previously, essential though this was, and it may be said that, as an account system, it works quite satisfactorily, except in one particular. Hitherto the accounts had been in the hands of the Accountant, and the records of the cost of labour and materials had been kept partly by him and partly by the professional officers. The Sub-Committee of April 14, 1886, recommended (*a*) the establishment of an independent audit of yard accounts and expenditure; (*b*) the appointment of local auditors; (*c*) the transfer of the preparation of accounts to the offices of the principal officers; and (*d*) thereby the abolition of the office of Accountant. This was a correct and business-like way of carrying out the work, but for some reason (*c*) and (*d*) were not carried into effect; and in 1887 the Accountant became the Expense Accounts Officer, with slightly different functions, certain work being turned over to the Cashier as the local representative of the Accountant-General. The true function of the Expense Accounts Officer was and is to keep the expense accounts for the Controller of the Navy. This officer was directly charged with the preparation of the accounts of cost of labour and materials, thus divorcing responsibility for expenditure on labour from the execution of work. No such system as this exists outside the dockyards; it is fatal to true efficiency, and is in direct antithesis to every other industrial organisation. The consequence is that the professional officers never know exactly how they stand, nor what is the actual cost of the work they are undertaking, especially on repairs. It is true that they can get some information from the

Business-
like re-
commen-
dations.

Expense Accounts Officer, and a return is sent to the principal officers weekly, but the superior officers, foremen, inspectors, and chargemen have no knowledge whatever of how the money is going. This is made worse by the fact that there is no item account for repairs, which are executed in the gross, unless the Expense Accounts Officer is directed to return the cost of any particular item or job. Construction is accounted for under several broad headings. The custom in all business undertakings is for the foreman (who corresponds with the dockyard inspector or chargeman) to render an account of the labour and materials expended on the work he undertakes, assisted by a clerk from the Accountant's Department, who visits him once or twice daily, and gets the returns and information required for embodiment. In the dockyards the Expense Accounts Officer has permanently attached to his staff a number of artisans of various trades, who become recorders. These recorders are supposed to visit every man in the yard once in the forenoon and once in the afternoon, and record the ship and in very general terms the job on which he is engaged; these records they transfer to the books maintained for the purpose. The system is costly, for these skilled artisans are taken from their tools, and receive additional pay. There is no reason why one of the several systems in daily commercial use should not be applied to the dockyards, nor why, beginning at the bottom, the chargeman who is in charge of a gang should not be primarily responsible for a record of his expenditure on labour; he will at least know what he is doing. An item account should also be introduced. The expense accounts are rendered in a form to meet the requirements of the House of Commons, and not in such a form as to be really helpful to officers responsible for work, so that, granting that they are accurate, they are of little value as a guide to economical working. Accounts to be of practical value should closely follow works, not works follow accounts.

Payments
of cash
and time-
keeping.

The Cashier makes all payments, and is also the "timekeeper" for entry and departure; but the departments are also timekeepers, and thus the Expense Accounts Officer gets a double check, and is partly a timekeeper himself. A simplification of this system could be introduced with advantage. No recording instruments are used. A Dey's Recorder was introduced at Devonport for the use of those whose duties obliged them to enter before or leave after bell-ringing. It was found most useful, but was, notwithstanding, ordered to be discontinued by the Admiralty on the adverse reports of officers of other yards, who had had no experience of this apparatus in actual use.

Works
Depart-
ment.

The Works Department is an entirely different organisation from that of the dockyard as a whole. It is under the Director of Works,

and paid for out of Vote 10. Its administration is much on the lines of the methods followed in civil business organisations, and relatively more efficient than that of any of the departments provided for out of Vote 8.

By the changes of 1905 the Managers were given authority over all entries of men for their departments, which is as it should be. Men entered have to undergo a medical examination, but in the past this has been notoriously ineffective, with the result that relatives and friends of *employés* have been entered who were physically unfit. It has long been a by-word in the dockyard ports that once a man was taken on in the dockyards, he was "all right," since discharges are difficult to effect, save in the case of absolute misconduct or unless reductions take place, when the most inefficient are naturally weeded out first. For this reason a slight ebb and flow, and the taking on of additional hands for special jobs, is always an advantage towards maintaining the standard of efficiency of the workmen, as well as a silent aid to discipline, exercised to the fullest extent in private industries, but hardly at all in the dockyards.

Labour;
Entries
and dis-
charges.

IV.

Coming to a consideration of the system of Admiralty administration of the dockyards, there are really only two factors which differentiate these establishments from the ordinary industrial organisations of the country. One is their geographical position, which has based them apart from the great industrial centres, whilst the other is a resultant of the preceding condition, as to supply of skilled labour, which naturally springs up around such centres, but has to be artificially attracted to the dockyard ports. Admitting these factors, which although they do not prevent, yet hinder expansion, there remain no others in which the Royal Dockyards really differ from other large industrial undertakings, except that of Parliamentary and Treasury financial control, which may be designated as of an administrative order.

Royal
Dock-
yards and
outside
establish-
ments.

The Admiralty and their experts, and even the Committee of 1885-6 (vide para. 49, 50, and 51 of report), have always held the view that the dockyards were radically different from any private yard or industrial establishment; but the proposition would be difficult of proof, and the truth is that it has always been assumed without being logically reasoned to conclusion. Both organisations have owners, the nation and the shareholders; both have directors, the Admiralty and the Board; both have managers; both have capital invested under

Difference
difficult
of proof.

almost identical conditions, and both should yield reproductive return respectively to the nation and the shareholders. Nor would it be difficult to establish a form of profit and loss account for the dockyards, even though they have not to earn profits in competition with a private industrial organisation. Para. 50 of the 1885-6 report is absolutely in error in supposing that "general observation on the method of conducting business, by criticism of estimates for proposed work and of the outlay incurred, and by careful financial review of expenditure," ensure efficiency. General observation can do no good unless accompanied by up-to-date knowledge of the best business methods and systems, and with power and capacity to apply them—a factor hitherto entirely wanting as far as the dockyards are concerned. Criticism of estimates and of outlay is not of the slightest utility when those estimates are not competitive, and when they are prepared in advance and without any knowledge of what work may have to be actually undertaken. It should be clearly understood that for repairs the estimates presented to Parliament are mere guess-work, based on what may be taken as an average. Nor can they be anything else, and a financial review of expenditure is worthless unless other knowledge is available to prove that the organisation and management are relatively efficient.

Decen-
tralisation
necessary.

The Admiralty administer six Home and six Foreign Dockyards, besides other establishments, but they are all of the same order, and their control compares with the control of modern industrial amalgamations, whose *raison d'être* is that it adds to efficiency and economy to combine and govern many instead of one or a few organisations, of much greater diversity than anything the Admiralty have to deal with, by central control. The difference, and, incidentally, the key to the position, is to be found in a sound system of decentralisation, which is adopted in all successful modern business organisations. Large establishments, employing close upon 40,000 people, cannot, according to twentieth century notions of sound business principles, be effectually administered by extreme conditions of central control; they must be decentralised. A report on the working of the American Railways, by Neville Priestly, Under-Secretary of the Railway Department of the Government of India, is instructive in this respect. Hereditary instincts based upon fear of the loss of power, and consequent timorousness, lead all Government departments to fence their subordinates in with voluminous regulations which soon become obsolete, infraction of which is so extremely reprehensible, and the difficulty and delay in effecting alterations so great, that little advance can be made. Subordinates give up the idea as hopeless, and become content to move along in the grooves laid down.

Parliament and the Treasury act for the nation, and their control is comparable to that of the shareholders in a company or corporation, which is generally very weak, but which endeavours to exercise its control very thoroughly and completely. The House of Commons, individually and collectively, and the Treasury seek to do their very best by the nation, but they deal only with paper estimates and accounts, and the very best and most complete of these will often hide grave defects, as has been fully illustrated. They are unaccompanied by the enlightenment of any form of profit and loss account, which, in a strictly commercial sense, cannot be carried out in Government establishments, and they are real traps for those who may be unacquainted with the practical working of an industrial organisation.

Financial
control.

Lack of space prohibits the discussion of the many minor points that might be enumerated as likely to make for efficiency in the dockyards, but one that cannot be passed over is the fact that the Royal Corps of Naval Constructors (consisting of the Director of Naval Construction, Director of Dockyards and Dockyard Work, 5 Chief Constructors at the Admiralty and 10 at the dockyards, 27 Constructors, and 59 Assistant Constructors—total 103, a small number) is practically a seniority corps, and it should tend towards the greater efficiency of the dockyards if promotion from Assistant Constructor to Constructor, and from Constructor to Chief Constructor, were to a greater extent a matter of selection based upon a definite length of service in each rank.

Royal
Corps of
Naval
Con-
structor

Another point for consideration is as to the estimates submitted to the House of Commons. Those for new construction are correct and essential, whilst those for repairs, as has already been said, are entirely based on anticipated averages; hence, the latter are of no value to the House of Commons. It is, of course, understood that the annual repairs of the Fleet must be carried out, and that certain ships must come in periodically for a general overhaul, a list of which can be submitted, and any special expenditure for alterations and additions, such as cooling arrangements for magazines, specially estimated for. It is believed that even the cost of this last-named necessary work, affecting the whole Fleet, was submitted and approved in the gross, and, if so, we have here an example of how the money for repairs should be provided. On this point the shareholders must trust the directors, and there is no doubt the nation will get better value for its money if this is done. The consequence of the existing system is that the dockyard estimates for repairs have to be forwarded to the Admiralty in December for embodiment in the Navy Estimates which have to be prepared for the meeting

Esti-
mates.

of Parliament. Not only have many of the ships not even been examined for defects, but for carrying out this largely speculative work, especially in the case of smaller ones, for which a general average is taken, it is a mistake to let the dockyards imagine that they have a certain good round sum to draw upon, whether actually necessary or not. It must not be supposed that some of these estimated amounts cannot be and are not reduced, but the practice does not tend to economical efficiency. Another faulty feature of the submission of estimates for repairs in detail is that there is no provision for contingencies, either at the Admiralty or in the dockyards, and this is the cause of delay both of construction and repair. The cruiser *Encounter* furnished an example of the former, and the examples of delays in repairs are too well known to mention. For every accident or contingency that occurs, whether it be the loss of the *Montagu*, the disaster to the *Gladiator*, or the stranding of a torpedo-boat, no contingent fund is provided; the consequence is that either construction or repairs or both have to give way and be postponed in order to provide for the necessity. The programme of repairs is consequently never completed and is always in arrears—a most unbusiness-like system. When money is asked for the repair of the Fleet, it should be specifically estimated for under these heads, viz.:

- (a) Annual Repairs;
- (b) General Refits, naming ships and giving any special reasons;
- (c) Extraordinary, for any alteration and addition applying to the whole Fleet or classes of ships; and
- (d) An additional sum for contingencies, as is customary in all business transactions.

V.

Dock-
yards still
inefficient.

Notwithstanding the completeness of their accounts, the dockyards have been and are still inefficient organisms, resulting in much consequent waste of the nation's money; figures could be produced to substantiate this. Reasons have also been given why the recommendations made by, and reforms instituted on, the reports of the Committees of 1885-7 have failed to produce executive efficiency. Consideration will now be given as to what methods could be adopted to secure this end. First, as to Admiralty administrative control.

Since the institution of a Controller (who since 1882 has been a Lord of the Admiralty) in 1860, the Dockyard branch has always been a part of his department. Previous to the reforms of the 1869

period, the Chief Naval Architect (now the Director of Naval Construction) was the principal official connected with this branch; but when the development of steam necessitated the introduction of an engineering branch, the management of the dockyards was rendered more complicated, and by an Admiralty Order of December 10, 1872, this was divided between the Chief Naval Architect, the Engineer-in-Chief, and the Surveyor of Dockyards, representing the existing Constructive, Engineering, and Dockyard branches of the Controller's Department, to which has since been added the Naval Store branch, in 1877, and the Controller's Accounts branch in 1887.

By 1885 work had increased to such an extent that the Surveyor of Dockyards was so completely absorbed by his task at the Admiralty that the intentions of the 1872 Order had become ineffective (see para. 34 of the 1885-6 report). The result was to bring about a reorganisation, accompanied by a change of title into that of Director of Dockyards; but this did not secure the desired effect, and by 1902 the conditions were again exactly identical with those described in the paragraph above quoted. So evident was this that another attempt was made in 1905 to mend matters on the same lines. The title was changed to that of Director of Dockyards and Dockyard Work, and some slight alterations made, but without achieving any appreciable improvement. In a word, this short summary shows that tinkering with defective systems will not avail.

Director
of Dock-
yards.

Down to 1897 it was considered necessary that the Controller of the Navy should have had previous experience as an Admiral Superintendent, which, at any rate, qualified him to deal with dockyard matters. Since then this policy has not been continued, and it follows that the officer who is responsible for the design, offensive and defensive powers, and equipment of the Fleet, should have had sea experience as a flag officer in a fleet, and should be in touch with its fighting requirements and their adaptations, for this is the object of primary importance, the dockyards being entirely secondary to it. Prior to 1897, experience has shown that the dockyard knowledge possessed by the Controllers has been of little use to them, because the above-mentioned primary object overshadowed it; their time and attention had to be given almost entirely to questions connected with the design, construction, armour, armament, and equipment of the many classes of vessels comprising a modern navy. When to this comes to be added inventions, the enormous advance in mechanical arrangements, and the great increase in the size and complexity of the Fleet, together with a trebling of the Vote for its maintenance, it will be realised that the Controller has more than he can do to

Controller
of the
Navy.

attend to his primary functions, and is unable to deal with the secondary efficiently. The Director of Dockyards is, consequently, tied to him in order to get through the current work. There is, therefore, no real provision at the Admiralty to adequately maintain the efficiency of the dockyards, and to this cause is to be attributed the failure of the 1885-7 reforms to effect the intended result.

Dockyard
branch
should be
consti-
tuted a
separate
depart-
ment.

This fact has hitherto been unrecognised, and the suggestion is that the remedy is to be found in an organic change, by which the Dockyard branch and such constituents of it as may belong to other branches of the Controller's Department, with the Naval Store branch, should be constituted into a separate department, identical with that of the Director of Works' Department and the Department of the Director of Naval Ordnance, with all the powers of direct communication to the Board, and the individual members of it, of a principal officer at the Admiralty. This plan, in some respects, as regards the dockyards, may with advantage be extended. Hitherto, the Director of Dockyards' Department has had neither real power nor authority. The Dockyard Department, as suggested, would be represented on the Board of Admiralty by the Controller, unless in the future pressure of Admiralty work were found to be so great that an additional Lord were required, when the Dockyard branch would fall to his share. The Controller's Department would hold the same position in regard to construction and engineering in the dockyards as it now does with the shipbuilding and other firms that undertake contracts for construction and engineering; the dockyards, in their relations with those branches, would occupy the same positions as contractors.

Head of
Dockyard
Depart-
ment.

It follows that the head of this new department must necessarily possess authority, and he should be selected from among the flag officers who have shown administrative capacity as Superintendents of Dockyards. It is not necessary for him to be on the active list, as the appointment should be of considerable duration. His instructions should not only contain those originally laid down for the Surveyor of Dockyards, and those framed for the Director of Dockyards, but they should further direct him to co-ordinate them in all particulars, and to adopt from time to time the most approved methods of business organisations, with which he should be enjoined to make himself familiar. The report on the Navy Estimates printed in August, 1885, especially Appendix XIX., as well as the 1885-6 report, shows how decentralisation was aimed at, but not secured, and since then the meaning given to the term, and the methods employed to attain it in all great organisations, has been one of the chief causes of their efficiency and success.

The dockyards should be brought into parallel lines with the best industrial organisations in the country by a system of true decentralisation, arranging for each :—

Reforms
suggested.

(a) A capital account under the heads on which expenditure would fall, with the addition of all capital expended and the Vote 10 cost of maintenance, while a percentage for deterioration should be allowed.

(b) A working account, both for construction and repairs. In both cases the time value of the machines used should be included, and in the latter an item or job account introduced.

(c) Each yard to keep its own accounts, on a similar system, and be subject to proper audit. These should be published and so arranged that the comparative efficiency of each would be shown. The yards would then be put into competition with one another and an incentive to good and economical work be provided, together with a comparative profit and loss account.

(d) Delegation to the Admiral Superintendents of the whole of the work, with power to do it as they choose, and to devise and carry out the best expedients for so doing without reference. They should have control of the capital provided in gross for improvements and new machinery.

(e) Abolition of all returns, except such as are necessary to compare results with other yards, and such returns as to state and progress of work as are essential for Admiralty compilation or information.

Efficiency will not be secured unless some measure of decentralisation of this order takes place, monetary responsibility is determined, and a comparison of performance made possible. As each yard progressed, the Director of Dockyards would take care that improvements made and found efficient in one yard should be applied to all, and also that co-ordination in the means and methods which he put forward were adopted.

If these reforms were carried out, personal responsibility would be placed on the Superintendents and their principal officers, and real efficiency secured. For the first time in their history, the yards would be established on a business foundation, with a true state of competition between them. Judgment would be possible by results, and the latent talent within them would strive to secure the best results, instead of being neutralised by over-centralised regulations. Men would be found who would rise to the occasion and be trained for it, for good men are wanted to efficiently work even the best of systems. The labour conditions of the dockyards are satisfactory, humane, and compare favourably with outside

institutions. The Admiralty took the lead in instituting an eight-hours-a-day working system, but no real improvement on their administration, in an executive sense, has taken place since the organic reforms in the middle of last century. The fifty years' period has been reached again, and it is time that endeavours were made, once and for all, to remove the reproach which has clung to the dockyards continuously since they came into existence, and been the cause of the periodic attempts to remove it. There is no reason why this should not be done, and the dockyards become examples of highly organised efficiency, looked up to instead of down upon: institutions of which the nation might well be proud.

W. H. HENDERSON
(Admiral, *retired*).

HERBERT RUSSELL.

CHAPTER V.

ALTERNATIVE SYSTEMS OF PROPELLING MACHINERY.

SELDOM, if ever, have the ingenuity and inventive faculty of our mercantile and naval engineers been so actively directed towards the improvement of ship-propelling machinery as at the present time. The success—from the thermodynamic standard—of the Parsons steam turbine has raised directly several problems affecting propulsive efficiency, and thus has stimulated a closer study of the theoretical, as well as the practical, principles involved. Fortunately, the research work is not confined to turbine problems only, but embraces the whole range of ship propulsion. As a consequence, there is greater promise of progress along lines already well defined, and perhaps also of fundamental departures of far-reaching influence. It is therefore important, and may be stimulating, to discuss the potentialities of possible alternative systems of propelling machinery, even although some part of such review must be more or less speculative. The steam turbine advances in favour on fuller experience, and the merits of the Parsons system are widely recognised, as is shown by its extensive adoption. Other designs are being tried in increasing numbers, and the British Admiralty have decided to fit the Curtis turbines to the second-class cruiser Bristol, in order that comparative tests may be made. Such a course must further strengthen public confidence in the technical officers at the Admiralty. Increased attention, too, is being devoted to the internal combustion engine; and, although the result so far is rather negative than positive, the obstacles to be overcome in practice are being more clearly defined and more fully recognised. There is thus concentration of effort on real as opposed to merely anticipated difficulties.

The steam turbine takes first rank as far as warships are concerned, for although minor improvements are being made in the piston engine in the merchant service, instances accumulate of the higher thermodynamical efficiency of the turbine. What is still more operative in influencing public opinion is the establishment by experience of its reliability, its greater freedom from breakdowns, and low cost of upkeep. As has been the experience of engineers in all

Reliability of
turbines.

mechanical advances, the correct proportioning of parts has only been arrived at by the test of time. Now, however, we have reliable knowledge as to the requirements for expansion and local stresses, and as to the clearances necessary in the dummies and the amount of rigidity needed in the casings and rotors. As a result, local expansion and contraction no longer involve the possibility of stripping the blades. Even more effective against this latter evil is the practice now always adopted of thinning the blades at the tips. For rotor ends forgings are now sometimes preferred because large steel castings are not always sound. It has been found that in heating up turbines it is better to use steam direct from the boilers, as it is more uniform in its effect. When the exhaust from auxiliary machinery is used, there is a danger that the expansion will not be uniform owing to variations of pressure or temperature, presumably due to the intermittent working of auxiliaries.

Difficulties met with in running turbines.

An analysis of the causes of difficulties met with in the running of marine turbines shows that in no case are they inherent to the system. The stripping of a ring of blades in the astern turbine of a very large installation was attributable to a spanner having been carelessly left within the casing, and yet the turbine ran for a year. All of the turbines in a Channel steamer, a yacht, and an ocean liner, and one of the turbines in a warship got their blades partially choked. In the two merchant vessels the cause was undoubtedly the priming of the boilers. It is of great importance that the steam-pipe should take its supply direct from every boiler; and yet in one case noted the supply pipe was connected directly only to the after boiler, which had communication with the other boilers. When there was any sudden increase in load, the turbines, to use the words of the engineer, "sucked the water from the near boiler," with the inevitable result of priming. As only one turbine in the warship was affected, it is probable that the cause is attributable to hurried manufacture—to the casting of the casing not being properly cleaned out—and to sand or scale being carried over by grease in the steam. In a few cases there has been slight corrosion, in one case on the drum, in others on the blades. The whitewashing of the drum has proved a preventive. Priming can be obviated with care, so that all of the difficulties above mentioned can easily be avoided. Even these troubles are insignificant when one recalls that there are in service marine turbines which collectively develop over 1,000,000 H.P.

Repair costs.

The year's repair cost of a paddle and turbine steamer in the Firth of Clyde service of the Caledonian Railway Co., according to data supplied to the writer by Capt. James Williamson, the marine superintendent, is £107 and £92 respectively.

The steam trials and sea service of steamers fitted with turbines continue to give constantly improving results.* The three cruisers of the Invincible class attained speeds of from 25·5 to 26·6 knots, differences mainly due to the proportions of the screw propellers fitted. The steam consumption was about 13 lb. per shaft horse-power per hour, whereas the six cruisers of the preceding class for the British Navy required 19 lb. per I.H.P. per hour. It should be remembered that shaft horse-power is 6 to 8 per cent. more effective than the I.H.P. The Invincible's boilers would require to have been 40 per cent. heavier to enable 43,000 shaft horse-power to be developed under the same degree of forcing. The consequent addition to the displacement of the ship, presuming other fighting elements to be the same, would have made a speed of 26 knots practically impossible. The coal consumption at full-power ranged from 1·2 to 1·7 lb. per shaft horse-power, the average for the three ships being 1·47 lb. per I.H.P., while in the three cruisers of the Minotaur class, with piston engines, it was 1·8 lb., and in the six cruisers of the Duke of Edinburgh or Warrior class 2·1 lb. per I.H.P. On the thirty hours' endurance trial at 70 per cent. of the total power, the turbines also proved more efficient, although the advantage was not so marked. In the case of the U.S. scout cruisers Chester, with Parsons turbines, and Birmingham, with piston engines, there were fewer variants, the hull being of the same dimensions and of almost the same form. Some consider, however, that here the piston engines were not thoroughly representative of their type. Steaming at 22·78 knots the Chester consumed 18,063 lb. of coal per hour, while the Birmingham, for 22·66 knots, required 20,510 lb. Thus, notwithstanding the differences in speed, the latter took considerably over a ton more coal per hour. At full speed the difference was still greater. The Birmingham only attained 24·325 knots, while the Chester made 26·52 knots, the coal consumed per hour was 29,904 lb. against 38,332 lb., notwithstanding the much greater power necessary for the higher speed. As regards merchant ships, Mr. Thomas Bell, the Engineering Director of Messrs. John Brown & Co., Ltd., who built the *Lusitania*, showed in a paper at the Institution of Naval Architects that the coal consumption of that ship was 1·5 lb. per shaft horse-power, equivalent to 1·4 lb. per I.H.P. per hour; and we have the assurance of Mr. Andrew Laing, the Managing Director of the Wallsend Engineering Company, who supplied the turbines for the *Mauretania*, that her steaming efficiency is equally satisfactory. A German authority publishes in the German technical journal *Schiffbau* data which give the comparative figures

Coal consumption results.

* See *Naval Annual*, 1908, pp. 94-99.

for one of the fastest German liners, fitted with piston engines, as 1·54 lb. per I.H.P. per hour.

At one-fifth power the coal consumption of the three Invincible cruisers averaged 2·4 lb., as compared with 1·87 lb. in the Minotaurs, and 2·05 lb. in the Duke of Edinburgh cruisers. On this low power trial the cruising turbines were of course in use. In the British service the navigating authorities insist on having the turbines on each side of the centre line independent, whereas in some other services, notably the German, the two cruising turbines, one on each side of the centre line, are worked in series, the port cruising turbine exhausting into that on the starboard side, or *vice versa*. This is conducive to higher economy, but has the objection that there must be a steam pipe and gland through the centre line bulkhead. In future, instead of having separate cruising turbines, the main turbine may be increased in length at the high-pressure end and have what may be termed in naval practice short "cruising" blades, with the usual high pressure blading at the after end. At full power the steam will be "bye-passed" to the middle of the drum, the high pressure end being then cut out. It remains to be seen what the effect will be in weight and in economy at low speeds.

Turbines
in series
on one or
two shafts.

This raises the important question of turbines working in series on two shafts or entirely on one shaft. Considerable interest has been awakened on this subject by a discussion at a recent meeting of the German Naval Architects' Society on a paper read by Dr. Bauer, an engineering director of the Vulcan Company of Stettin, who build fast merchant steamers and warships. There is something to be said in favour of each shaft having an independent unit compassing the whole possible range of steam expansion. Where the power is equally divided between each side of the centre line, there should be little difficulty from the navigation standpoint whether two or four propellers are used, and it is claimed that in the three-screw system the centre screw improves rudder action. Where "series" working is not adopted the weight is much greater on the twin screw arrangement than with triple or quadruple screws. For equal efficiency in turbine and propeller combined the weight of the turbines and screws is said to be about 60 per cent. greater with the two shaft arrangement, but that of the shafting and auxiliary machinery is about the same. This increase in weight, it is contended, may be justified by the lower speed of rotation and the possibilities of higher propeller efficiency. On the other hand, the loss of one of four propellers, or the breakdown of one of four units of machinery, has less effect upon speed and manœuvring than the stopping of one of two units.

Screw
propeller
problem.

The propeller difficulty continues to occupy much attention, and there is just the danger that it may be magnified to such an extent as to overshadow the all-embracing issue. It is well, of course, to aim at the highest efficiency in each unit, from the boiler to the propeller, but equally important to recognise the need for such a combination with compromises as will secure the utilisation at the propeller of the highest percentage of heat units at the boiler end. Some have attempted to lay down empirical rules as to proportions of propellers and peripheral speeds; but our knowledge of the question is too indefinite, and the results hitherto too varied. In experimental tanks much research has been done with model screws, but it is open to question whether the smallness of the models and the high rate of revolution do not involve indefiniteness in the ratio of blade friction to other resistances. Certain it is that those who recognise the accuracy of general tank experimental work are inclining towards tests with such boats as the launch, one-twentieth the size of the *Mauretania*, which proved so useful in connection with the design of that vessel. The experimental work has been continued with this launch, and the new wing propellers of the *Mauretania* are a result. The Admiralty, too, recognise the importance of the problem, and the sets of propellers ordered for the ships of a class are all different in their proportions; in some cases even two sets are ordered for one ship, and although the spare set may cost £4000 for a ship of the *Invincible* type the comparative results got are of great value to the service. The variations possible in practice are suggested by the difference in slip. In turbine channel steamers it may be 25 per cent., in ocean liners 22 per cent., while in the two great Cunarders 9 per cent. is nearer the mark. High authorities in this country and in Germany are satisfied that propellers can be designed to work efficiently at the high speed of rotation desirable with turbines, to suit the essential that the blade speed should bear as high a ratio to the steam velocity as is necessary for good efficiency.

The
Curtis
turbine.

The Curtis turbine* is designed on the one-shaft unit system, and further practical experience of it will be followed with interest. The British cruiser *Bristol*, which is to be fitted with Curtis turbines by Messrs. John Brown & Co., Ltd., who own the marine patent rights for this country, will be driven by twin-screw propellers, while the four other ships of the class with Parsons turbines each have four propellers. The engine room of the *Bristol* will therefore correspond in its arrangement to that of the old twin piston-engine ship, and will probably be simpler than the Parsons engine room. There

* See *Naval Annual* 1908, p. 104.

need be no cruising turbines as it is possible to vary the power in the Curtis turbine by the number of nozzles guiding the steam in jets to the blades in the high pressure stages. Thus the full boiler pressure can be utilised at all speeds, whereas in Parsons and other reaction turbines power is lessened by reducing the steam pressure at the throttle valve. The Curtis arrangement, it is contended, will give a better economy at low power; but the comparative trials of the three United States scouts, respectively fitted with reciprocating, Curtis and Parsons engines, do not seem to bear this out. It is possible, however, that with an increased number of expansions in the Curtis turbine in later ships better results will be got at low speeds. The ships were similar and the trials were conducted with the fewest variants, the displacement being the same—4700 tons—and the results as tabulated show that at 12 knots speed the two turbine ships are practically on an equality, and 11 per cent. more economical than the piston-engined ship. At $22\frac{1}{2}$ knots speed the Parsons-engined ship got 0·25 miles per hour more speed for 2·3 per cent. less coal than the Curtis-engined ship, and at full power 0·58 nautical miles per hour more for practically the same total coal consumption.

COMPARATIVE RESULTS OF UNITED STATES CRUISERS WITH
DIFFERENT PROPELLING MACHINERY.

—	BIRMINGHAM.	SALEM.	CHESTER.
Engines	Reciprocating.	Curtis.	Parsons.
19 knots' Trial—			
Speed for 24 hours . . .	12·228 knots	11·93 knots	12·2 knots
Revolutions per minute .	91·4	164·11	250
Coal consumption per hour	4,629 lbs.	4,051 lbs.	4,091 lbs.
22·5 knots' Trial—			
Speed for 24 hours . . .	22·665 knots	22·536 knots	22·78 knots
Revolutions per minute .	172·1	312·5	473·5
Coal consumption per hour	20,510 lbs.	18,485 lbs.	18,063 lbs.
Full Speed—			
Speed for 4 hours . . .	24·825 knots	25·947 knots	26·52 knots
Revolutions per minute .	191·66	378·39	614
Coal consumption per hour	29,904 lbs.	38,502 lbs.	38,332 lbs.

Messrs. J. Brown and Co. are constructing at Clydebank a complete Curtis installation with the view of making searching trials before designing the machinery of H.M.S. Bristol. The reputation of the Clydebank staff for experimental research, combined with their experience of all marine conditions, justifies the keen interest in the tests and the expectations of improved efficiency. At the time of

writing this machinery is not completed, so that it is not possible to give results.

PARSONS MARINE TURBINES COMPLETED AND UNDER
CONSTRUCTION.

—	War Vessels.		Mercantile Vessels.		Yachts.		Total.	
	No.	H.P.	No.	H.P.	No.	H.P.	No.	H.P.
Great Britain . . .	91	1,120,800	47	482,700	6	17,000	144	1,620,500
United States . . .	14	194,000	6	40,000	8	9,500	28	243,500
Germany	11	176,000	—	—	—	—	11	176,000
France	13	190,800	1	9,000	—	—	14	199,800
Japan	2	32,700	7	76,800	—	—	9	109,000
Austria	1	20,000	—	—	—	—	1	20,000
Belgium	—	—	2	22,000	—	—	2	22,000
Italy	2	47,000	8	32,500	—	—	5	79,500
Russia	2	60,000	—	—	—	—	2	60,000
South America. . .	3	38,000	2	15,000	—	—	5	53,000
	189	1,879,300	68	677,500	9	26,500	216	2,583,300

The Parsons turbines now in use, or in course of construction, represent collectively, as shown in the appended table, over two and a half million H.P. Practically all the Naval Powers have adopted the system, notwithstanding that patriotic considerations operate towards a preference for machinery of native invention. Thus the decision to adopt this design for the new battleships in the United States, even after tests of the Curtis system, in France after experience with the Rateau, in Germany after a study of the Zoelly, Stumpf and other inventions, as well as in the ships of the Brazilian, Spanish and Austro-Hungarian Navies, carries its own significance.

H.P. of
all
turbines
in use.

The Curtis system is of more recent origin, and in addition to its adoption on the American scout Salem and in a German destroyer, it is being fitted in a Japanese battleship and cruiser, the British cruiser Bristol, a United States battleship and two destroyers, and a German cruiser, the power for naval ships built and building totalling 160,000 H.P.

The Zoelly turbine is being installed in a cruiser and destroyer for Germany, a torpedo-boat and torpedo-boat destroyer for France, and in two torpedo-boats for the United States, the total power being about 87,000 H.P. The Rateau turbine is being fitted in one or two ships.

The
Rateau
and Zoelly
turbines.

The Rateau and Zoelly steam turbines are identical in principle, and may be technically described as belonging to the pressure compounded impulse type. Each complete machine consists, in short, of a number of distinct turbine wheels working in separate chambers, but all mounted on and driving one and the same shaft.

The steam enters the chamber at the high-pressure end of the turbine through a series of "guide-blades," in passing through which it expands from a pressure of, say, 140 lb. above the atmosphere down to one of about 115 lb., and by this expansion it acquires a velocity of about 750 ft. per second. This very rapidly-moving mass of steam strikes the buckets secured to the rim of the wheel in the chamber, and thus drives it round. In doing this it loses much of its own velocity, and is delivered from the buckets in a relatively quiescent state. It then passes through a second set of "guide blades" into the second chamber, expanding further in passing through these "guide blades," so that it enters this second chamber with a velocity which has again reached 750 ft. per second, whilst its pressure has fallen to about 93 lb. above the atmosphere. The process is repeated until the steam is finally discharged from the last chamber into the condenser at a vacuum of 27 in. or 28 in. As the steam expands from chamber to chamber its volume of course increases, and greater and greater area must be provided through the "guide blades" for each successive chamber. It is usual, therefore, to make the "guide blades" in the first chamber subtend only one-eighth to one-sixth of the circumference of the wheel on which they discharge, whilst at the low-pressure end of the turbine they cover the whole circumference of the wheel. In technical language, the turbine works with "partial admission" at the high-pressure end, and with complete admission at the low pressure end. With turbines of the Parsons type partial admission has not been used, and the actuating steam is supplied over the whole circumference of the moving blades.

Problems
in pres-
sure or im-
pounded
impulse,
turbine
design.

This working with partial admission is an attractive feature of the impulse type of steam turbine. So far as the writer is aware, the bucket-speed of any marine turbines never exceeds 150 to 180 ft. per second. If this limit be much exceeded serious difficulties are encountered, the nature varying with the type of turbine. Propeller efficiency is to a small extent a limiting factor as regards revolutions in the Parsons system. In all turbines there is a close connection between the steam speed and the bucket speed. In an impulse turbine the bucket speed for highest efficiency should be something less than half the steam speed, and land turbines are not infrequently run with a bucket or blade speed equal to about one-third the steam speed. If the bucket speed is less than one-third the steam speed the efficiency falls off rapidly. Hence for marine purposes the steam speed from the nozzles should be not 750 ft. as taken above, but 450 ft. only. The drop of pressure in the first chamber will be about $7\frac{1}{2}$ lb., in place of 25 lb. or from 140 lb. per

square inch down to about $132\frac{1}{2}$ lb.; and, in fact, four chambers will be required to take as much work out of the steam as is taken out in a single chamber of an electric light turbine. Consequently the weight and cost of the turbine are greatly increased. Theoretically, with partial admission it should be possible to run at nearly the same bucket speed in marine as in electric light turbines, and yet keep down the revolutions of the propeller to a reasonable limit. This can be done by increasing the wheel diameter; but the difficulty then met with is that the weight of the moving disc increases faster than the square of the diameter, so that doubling the diameter of the wheel in order to keep down the number of chambers involves a greater increase of weight than a fourfold increase in the number of chambers. Again, with large discs the losses by disc friction become very serious. A 10 ft. wheel, running at 280 revolutions per minute in steam at a pressure of 100 lb. absolute, absorbs in disc friction alone not far off 18 H.P. At this speed of rotation a turbine wheel of 10 ft. diameter would have a bucket speed of 148 ft. per second only, in place of the 300 to 380 ft. per second common in electric light turbines. To drive the disc aforesaid at 560 revolutions would require eight times the power above stated. Hence it will be obvious that the moderate speed of revolution required for screw propulsion cannot be obtained in pressure-compounded impulse machines by making a more extended use of the system of working with partial admission; but as with the reaction turbine it must be done in the main by increasing the number of "stages"—to use the technical term for each chamber of an impulse turbine.

In electric light practice the "disc" machines, as the usual form of impulse turbine may be perhaps called, have very many less stages than the Parsons type of turbine. Technically considered, each successive drop of pressure constitutes a stage of a turbine. In a Parsons electric light turbine there are often 150 of the stages thus defined to do the work accomplished by the 14 or 15 stages of a Rateau or Zoelly turbine; yet the former is not very materially longer between bearings. Thus, alternative Zoelly and Parsons type designs for a turbine of 3000 kw. rated capacity, and for the same guaranteed steam consumption, differed only by a length of 6 in. in this measurement, and the Parsons was actually the lighter in weight and the cheaper to construct, in spite of the enormous difference in the number of blades. This fact, taken in conjunction with what has gone before, shows clearly the difficulty of using for marine propulsion disc machines, in which pressure compounding is alone resorted to. The Curtis turbine is, of course, a disc machine, but the difficulty here is to a large degree turned by employing the principle of velocity

compounding. Nevertheless, the turbines of the Curtis turbine scout Salem weighed 204 tons against 155 tons for the Parsons turbines of the Chester, inclusive of those used for cruising.

A German
marine
turbine.

From a paper read by Dr. Lasche at Berlin in June, 1906, it appears that the famous Allgemeine Electricitäts Gesellschaft at Berlin, in their marine designs, are using the disc system of construction for the high-pressure end only of their marine turbines. While this high-pressure end works on the pure Curtis principle, the low pressure end is constructed on the drum principle, resembling here the well-known Parsons type; but the drum carries impulse and not reaction blading, which theory at least would lead one to suppose would be less efficient. At this end of the turbine relatively long blades are always practicable in a reaction machine, and experience shows that they are very efficient. The latest Zoelly marine turbine designs appear to be similar to the Allgemeine type just described.

A Swiss
turbine to
be tried
in the
German
Navy.

Another turbine which appears to be adapted to marine propulsion is the modification of the Parsons turbine invented by Mr. Pfenninger, a Swiss engineer. This turbine has given good results in land service, and is now to be tried in the German marine. It is known on the Continent as the Melms-Pfenninger turbine, and here as the Melms-Pfenninger-Sankey turbine, the same idea having been hit upon by Capt. H. Riall Sankey. The whole of the low pressure end of this turbine is exactly like that of the Parsons, but the H.P. end in the Pfenninger is constructed as an impulse machine which makes possible the use of partial admission, so that the bucket speed can be made the same as at the low pressure end of the turbine. Consequently there is a large reduction in the number of stages needed. The difficulties due to excessive weight and friction which appear in the disc machines are avoided by constructing this impulse section on the drum principle. Theoretically this should result in large leakage losses as compared with the disc machines, since leakage takes place round the whole circumference of a large drum in place of merely round the edges of the hole through which the shaft passes as in disc machines. The makers claim, however, that these losses are actually less, owing to the possibility of working with very small clearances in the case of a rigid drum. With this type of turbine it would be possible, theoretically at least, to dispense with the cruising turbines by arranging at low powers to close some of the guide blade openings into the successive chambers of the impulse section, but the mechanical difficulties in providing for this appear considerable.

Turbo-
electric
propul-
sion.

All turbines have, although in varying degree, the disadvantage that their speeds of rotation require to be so great, to suit the velocity

of the steam, that the propellers cannot be worked slowly enough to ensure their highest efficiency. A compromise between these opposing conditions gives a satisfactory combined efficiency, as has been explained, but electricians have lately revived a proposal, made years ago by Mr. Parsons, to couple the turbine to an electric generator to provide current for motors separately driving each propeller shaft. The turbo-electric generator certainly gives about 5 per cent. higher thermodynamical efficiency than any turbine suited for propeller driving, because there is not the same limit to speed. The difficulty, however, is in varying the speed of the motor. To overcome this it is proposed to have a polyphase motor with a stator, and inside of it a spinner, and within it, again, the usual armature. The spinner would rotate independently of the armature, and thus three speeds ahead or astern would be possible without loss of efficiency. Another proposal to the same end is to have a squirrel-cage induction motor, which would give a great range in speed. The durability of the motor under conditions of wide and frequent change in load is difficult to estimate. There would be no trouble in devising mechanically-operated switches to be worked from the bridge. The suggestion is that this electric drive would enable the propeller speed to be normal. This would make it possible to use the most efficient proportions of screw propellers, and it has been suggested that the gain thus secured in the propeller would more than outweigh the inevitable loss of 10 to 15 per cent. in the electrical transmission. The scheme has attractions, but the cost and weight are uncertain elements in our present knowledge.

We have not, however, reached the ultimate economy of the turbine. Just as the piston engine has been greatly improved since Watts' time, so will the turbine undergo advancement. Recently much has been done in increasing the vacuum in the condenser. Formerly 24 in. to 26 in. was considered quite satisfactory with reciprocating engines; and excusably so, for while an advance from 26 in. to 28 in. decreased the steam consumption by only 2 per cent. for a given power in the piston engine, a similar augmentation of vacuum in the case of the turbine gives a saving in practice of 16 or 17 per cent. To ensure a vacuum of at least 28 in. the Parsons Company have applied their well-known augmenter condenser, which has enabled vacua of $28\frac{1}{2}$ in. to be maintained. Another system adopted in the Navy is that of Messrs. Weir, of Glasgow, who guarantee so high a heat transmission that the condensed water is delivered within about 5° F. of the maximum temperature possible in association with the high vacua. This result has been attained by a careful experimental investigation into the best proportions of

Improved
con-
densers.

tube surface and tube length and diameter for the conditions to be met, and by ensuring the complete distribution of the steam at suitable velocity over all parts of the cooling surface. In official trials a Weir's "Uniflux" condenser gave a vacuum of 28·6 in. with the barometer at 30 in. The reduction in condensing plant, in association with the increase in power due to higher vacuum, is a great advantage in warship design.

Combined
turbine
and recip-
rocating
engines.

The great value of high vacua in the turbine is due to the high range of expansion possible. In a good quadruple expansion engine the steam is expanded down to about 10 lb. absolute, at which it is released into the condenser. An attempt to expand it much further would involve a cylinder of such capacity as to be inefficient, partly because of the area of cooling surface presented by the cylinder walls and piston, and partly because of heavy piston friction losses. Accordingly reciprocating engines are now being fitted in association with a turbine using the exhaust steam. Such a low pressure turbine, in association with high vacua, enables 100 expansions in volume to be realised, the steam being finally discharged at 1 lb. absolute. These low-pressure turbines, too, run at relatively low speeds, so that the propeller efficiency may be high. Usually the low-pressure turbine is on a centre shaft, the wing shafts having the reciprocating engines, the exhausts from both of which pass to the turbine when running ahead, and to the condensers when reversing and manœuvring, the turbine being then out of action.

Such a combination is being fitted by Messrs. Harland & Wolff to one of their Atlantic leviathan ships, the wing propellers being designed for 85 and the centre or turbine screw for 230 revolutions per minute. Messrs. Denny, of Dumbarton, have already fitted the system to a New Zealand liner, and Messrs. Parsons to a yacht. There are, at the time of writing, no reliable data as to results in practical working; but the trial results of the New Zealand liner indicate an economy of 15 per cent. over ordinary twin screw reciprocating engines, the consumption of steam being under 12½ lb. The weight is in favour of the combination, especially when less coal is required on a voyage; on a long trip this makes an appreciable difference in the total weight needed for the machinery out of the displacement of a ship. As to cost, few data are available, but it would seem as if the combined system may be a trifle more costly than ordinary corresponding quadruple machinery. Tenders for turbines for recently ordered warships of great speed show that the price asked for turbines alone, with fittings, but excluding valves and pumps, was £2 10s. per shaft horse-power, while the corresponding price for reciprocating engines built to the same standard would be about £1 16s. per I.H.P.

Thus turbines proper are more costly than reciprocating engines; but the steam demand is less, and the reduction in the boilers compensates for the increase in the cost of engines. The total for turbine and reciprocating machinery, including boilers and auxiliaries, is practically the same. There is no mechanical difficulty in connection with the combination of piston and turbine engines. The New Zealand steamer referred to had at the time of writing made a non-stop successful run from Teneriffe to Auckland, but no data are available. The machinery is well adapted for vessels of from 13 to 18 knots, but not for high speed warships.

Another much-discussed possible source of increased economy is the use of superheated steam. Each 10° Fahr. of superheat reduces the steam consumption of turbines by 1 per cent. There is no obstacle to using steam superheated to 150° or 200° Fahr. in the turbine. It is adopted on land installations, but in marine practice the feed water has too frequently a high degree of salinity, and as a consequence the superheater tubes soon suffer.

Super-
heated
steam.

The internal combustion engine has great fascination for most engineers, because the thermal efficiency attainable is double that of the steam engine; each horse-power can be maintained by the use of less than 1 lb. of coal or oil per hour, and the weight of a complete plant may be reduced. The problems to be yet solved are associated with flexibility, reliability, and vibration. The navigator is right in demanding no compromise in these essentials, but they are possible of realisation. It is eminently a case for slow evolution. There are many inventions, but few practical successes which yet justify an installation of any high power for warships or merchant liners. Good results have been got with engines up to 400 or 500 B.H.P., but in this, perhaps more than in other mechanical productions, the step from small to great things is obstructed by serious difficulties.

Marine
gas
engines.

The Admiralty authorities, like others, have found that the generator for producing gas from coal still requires great improvements before it can be pronounced reliable. The use of anthracite gets rid of some of the trouble; but this coal is costly, and is not obtainable in ordinary pots, whereas bituminous coal is universally available. Certainty of supply is more important than cost from the Naval point of view. The Navy now spends £1,500,000 per annum on coal, and it is well that this amount should not be unnecessarily increased. The tar and hydro-carbons from bituminous coal clog the engine valves, and involve extensive gas scrubbers and other cleansing appliances. When the engine is stopped temporarily the cutting-off of the air-supply to the producer tends to the cooling down of part of the fuel, and from this and other causes there is caking, which inter-

Gas
producer
difficul-
ties.

feres with the efficiency of the producer. Revolving grates and mechanical stirrers have been tried, and there are proposals to feed the coal continuously through a series of spray jets at various levels, which might be controlled to suit the engine load. There is a difference of opinion as to whether the producers should be on the suction or pressure system. For ships the latter has much to commend it. There is, however, a difficulty from the possible leakage of poisonous gases into confined areas, such as the stokehold and engine room, a danger which is greater with the pressure system. The gas pipes, etc., might, no doubt, be fitted with an air jacket through which air could be drawn by the compressors; but this would involve some reduction in the accessibility of the apparatus.

The re-
versibility
of the gas
engine.

To the navigator the engine has more interest. Gas engines for land stations have been constructed, developing 1850 B.H.P. in a single cylinder, the diameter being 53½ in. Steam cylinders of over 110 in. are in use, but, of course, with much lower pressures than a gas-engine cylinder has necessarily to sustain. The former, however, are all horizontal engines, which are not favoured for marine service. Vertical gas engines hitherto built are of comparatively small power. Again, with valves and pistons of large area trouble is probable, owing to the very high temperatures to be sustained. Various alloys have been tried to prevent trouble from distortion, but without effect, and water jacketing of the exhaust valves and pistons of the larger engines is now universal. Much yet requires to be done to simplify valve motions.

But the lack of flexibility in speed and in the direction of rotation of the gas engine is the prominent disadvantage. Many engineers are experimenting to enable the rate of revolution and power to be varied and to achieve reversibility. It is suggested that as each cylinder is a separate unit, one or more could be disconnected for low speeds. But this takes time, and in warships instant change of speed may be of vital consequence. With four shafts and four propellers two engines might be idle for low speeds. Perhaps a better method to increase flexibility would be to compress the gas and the air in separate pumps and pass them to reservoirs, whence the engine could be supplied through valves which would control the volume and, therefore, the power developed. The same result might be got in part by altering the advance of the ignition spark, but this method, although effective, is not economical. It has also been suggested that gas and air at high pressure might be ignited in a chamber separate from the engine, and the products of combustion, passed through a spray of water, thus cooling and mixing them with superheated steam, when the product would have properties enabling

it to be used in successive cylinders as in the compound steam engine.

These proposals may eventuate in a compromise which will give a reversible engine; they suggest a line of research more promising than work on clutches and other gear for reversing the motion of the shaft. The separate compression of gas and air to give a two-cycle engine is inevitable, although it may reduce economy. The possibility of igniting the contents of the reservoir by a flash back from the cylinder through the connecting pipes may be guarded against by an obstruction on the principle of the non-return valve. A fan will always be needed for supplying air to the gas producer and a compressor for air to start up the engine, and for manœuvring at low speed. The addition to the existing four-cycle gas plant for two-cycle working is thus only a gas compressing pump, which would not materially add to the weight. Another proposal is to use the gas for applying pressure to water for driving hydro-turbines coupled to the shafts.

There are still the mechanical difficulties inherent in an explosion engine. With single cylinder engines fly-wheels ranging in weight to 90 tons have had to be used to give a satisfactorily uniform turning moment; but such a device would not be needed with six or more cylinders, and with multiple cranks vibration might be minimised.

The measure of success achieved by the gas engines in H.M.S. Rattler indicates that there is a future for the system. This gunboat is the training ship of the Clyde Division of the Royal Naval Volunteer Reserve, of which the Marquess of Graham is commanding officer. He is also a director of Messrs. William Beardmore & Co., Ltd., and Mr. Beardmore is a strong advocate of the gas engine. It was therefore decided to utilise the Rattler for demonstrating at sea the success attained at their works with a Capitaine-Beardmore gas engine, constructed under the direction of Mr. W. W. May, the engineering manager of the works. The suction producer in the Rattler uses anthracite coal, which is admitted by means of a feeding hopper in a water-cooled cover. The steam used by the producer is supplied by "boilers" arranged one on each exhaust branch of the engine. These are casings containing a nest of tubes, around which the exhaust gases pass. Besides supplying the necessary steam, the "boilers" effectively silence the exhaust. After leaving the producer the gas passes upward through the cooling tower, which is simply a vertical pipe, down which water is sprayed. This also removes dust and grit. Thence it goes to the centrifugal drier, in which a high speed fan throws out all water, etc., which is drained away to the water seal. From the fan the gas passes to the cleaner, a square

Gas
engines in
H.M.S.
Rattler.

box fitted with a labyrinth of closely packed perforated plates, upon which settles any dirt or water that may possibly have escaped the action of the drier. Thence the gas goes to the engine.

The engine is of the vertical single-acting open type, with five cylinders, and a fly-wheel abaft the first two. The ordinary four-stroke cycle is used, each cylinder being 20 in. in diameter, with a stroke of 24 in., and developing 100 B.H.P. The crank shaft runs at 120 revolutions per minute. The pistons are not water-cooled, and the open framing adopted renders the connecting rods and cranks fully visible from either side. Starting is effected by means of gas stored in reservoirs at a pressure of 95 lb. per square in. This is turned on, and the engine is moved by a bar. The compression relief cams being in action there is no compression in the cylinder, and the momentary automatic depression of a special starting valve allows the gas to enter immediately before the firing point. A baffle device of numerous thin plates prevents any possibility of a back fire in the gas pipe. Moreover, the mixture cannot be fired until the admission valve is closed. As soon as the engine starts, the starting valve gear and the compression relief gear are, of course, put out of action. The engines are reversed by means of a hydraulic clutch and epicyclic gear. Other auxiliary apparatus includes a small steam-driven compressor for filling the starting reservoirs. For this and other purposes on board for which steam is useful a vertical donkey boiler is installed. The best run of the Rattler, alike as regards speed and economy, was from Greenock to the Isle of Man and back, 262 miles, when the mean speed was $8\frac{1}{2}$ knots, and the coal consumption 4 tons $16\frac{1}{2}$ cwt., equal to 360 lb. per hour. The embodiment in a larger set of engines of the same design, modified as a consequence of experience gained, would give suggestive results.

Oil
engines.

Oil engines are not quite so actively advocated for ships as gas engines, although offering greater advantages in respect of weight, due to the absence of the gas generator, with its indispensable scrubbers, etc. The reason is to be found in the absence of oil supplies in this country and in the uncertainties as to price. The application of the system for driving electric generators on board of warships is under trial in several battleships and cruisers. In these engines, of the Mirrlees-Diesel design, the four-stroke cycle is adopted, but the first down stroke only draws in atmospheric air, which is compressed on the return stroke to about 500 lb. per square in., raising the temperature sufficiently (to about 1000° Fahr.) to ignite the oil admitted as a spray immediately after the beginning of the second down stroke. This ignition, which is gradual, is regulated by varying the duration of the period of spraying.

The return stroke expels the products of combustion to the atmosphere. There is thus no sudden concussion, and therefore not the same stress on the working parts; and as the air only is compressed there is no risk of premature ignition. The volume of oil sprayed regulates the power. The engine uses crude oil—that adopted in the boilers as fuel—and the consumption at full load is about $\frac{1}{2}$ lb. per B.H.P.—about one-fourth that in high speed steam engines; while at one-fourth load it is 0·8 lb., about a third of that required in steam engines. The economic question becomes one of the comparative cost of oil and coal used per unit of power, as oil at 70s. per ton is so much dearer than coal. The Diesel and other systems are extensively used in small craft on the Continent, and for pinnaces, but they have the friction clutch and reversing gear on the shaft, so that while suitable up to 400 or even 500 H.P., their adoption for ocean-going ships seems distant.

The Vickers Company are known to be working on gas and oil engines on the two-cycle principle, compressing the air in an independent pump, and it is understood that a mean pressure of 180 lb. per square in. is obtained in the working cylinder. The oil is sprayed into the cylinders in such a way as to enable the power to be greatly varied. The engine, too, can be reversed by a combination of eccentrics and cams operating the valves. Experiments are in progress for utilising the heat in the waste products. This system is being developed for electric generation on board ship as well as for propulsion, so that there is prospect of steady evolution towards the use in ships of large internal combustion engines using high flash-point oil.

The internal combustion turbine does not make much progress. One of the seemingly insurmountable difficulties is that the high temperatures of the gas would burn the blades. It was suggested that this temperature might be reduced by the expansion of the flame in a divergent nozzle. Mr. Parsons and Mr. Stoney made some experiments with a flame flowing under pressure through such a divergent nozzle. A platinum wire was placed at each end, and the temperature effect on it observed through glass windows. It was found that the two wires attained almost identical temperatures, both showing a bright red heat. The gases had cooled on expansion, but the heat was restored by the impact of the volume of gas against the wire. The same result would occur with the blades. The velocity of the gases would be greater than that of steam; and although this might not present insuperable difficulties, especially if the gas were passed through a set of Curtis elements, it is doubtful if our present knowledge brings us any nearer the accomplishment of success.

Oil or gas turbine.

Light oil
engines.

There has been distinct advance in light oil or vapour marine engines, and these may yet be used for torpedo craft, but not with petrol because it is so easily fired; moreover, its cost is increasing, and the demand grows faster than the supply. There are substitutes, of which alcohol is gaining favour. In the United States, where concessions are made by the Excise authorities in the case of industrial alcohol, there is considerable experience, which is thus summarised by an American writer:—"In spite of its lower thermal value it has been shown—in motors specially designed for its use—to give almost equal B.H.P. output (pound for pound) as gasoline (petrol). It is susceptible of much higher compression than is the latter without danger of pre-ignition; it diffuses more readily in forming a uniform mixture with the air charge, and it has a far wider range of 'proportions' of mixture over which it can be exploded. Also it has the great advantage of being readily extinguished when free burning by application of water, a difference from gasoline akin to the difference between safety and danger. A slight pre-heating is necessary when starting from cold conditions, but all mechanical difficulties connected with its use have been overcome."

The most remarkable petrol machinery constructed in this country for marine use is that being made by the Wolseley Tool & Motor Car Company, Ltd., for a racing motor boat. The twin engines of the Siddeley type will each have twelve cylinders, and will develop together 750 B.H.P., although only 6200 lb. in weight. This is a great advance on the engines of the same class for the Duke of Westminster's racing boat of 1908. The two engines in this case had eight cylinders, and together developed 400 B.H.P. for a weight of 3540 lb. The boat, 12 metres long, attained a speed of 30·28 knots on a petrol consumption of 17 gallons per hour. The new boat will be 15 metres long; the weight per H.P. ($8\frac{1}{4}$ lb.) shows how successfully metallurgical problems have been tackled.

Messrs. Yarrow and Messrs. Thornycroft have also done splendid work in this department of marine engineering. In addition to several launches and racing vessels propelled by petrol machinery, the former have built four motor torpedo-boats—a 60 ft. torpedo-boat, *Mercury II.*, for the British Admiralty; two 60 ft. protected gunboats for the Austro-Hungarian Government; and a 100 ft. sea-going torpedo gunboat, specially designed for keeping the sea for long periods. The advantages possessed by this class of vessel over similar vessels propelled by steam include the absence of flaming from the funnel, the reduction of the engine room staff to half, the threefold increase of the range of action at full speed, the almost instantaneous increase from slow to full speed, and, in the case of the smaller boats, the

greater facility with which the vessel can be transported by rail overland from one coast to another. The following is a comparison between a 60 ft. torpedo-boat, with internal combustion engines, and a similar torpedo-boat with steam machinery, both built by Messrs. Yarrow & Co., and both of approximately the same power, viz., 300 H.P.:—

—	Speed, carrying a load of 3 tons.	Radius of action at full speed.	Fuel capacity.	Lifting weight for transport by rail.	Weight of machinery.
With internal combustion or petrol machinery	knots 24	miles 250	tons 1	tons 8	tons cwt. 3 10
With steam machinery . . .	18	108	2	12	6 1

Messrs. Thornycroft have developed their car motor practice for marine use. One of the most notable applications is their eight-cylinder set of 700 B.H.P.—in two independent four-cycle units—for Italian submarine boats. This engine uses paraffin or petrol. In place of the usual method of reversing by means of a double set of cams, a system has been devised by which a cam shaft always runs in one direction, irrespective of the way the engine is turning. To effect this the cam shaft is fitted with a reversible bevel drive with positive clutches. The engine is started in either direction by means of compressed air, the valves controlling the air being shut off the moment the engine starts firing. The ignition is by a low-tension magneto machine, which, together with the distributor, works in conjunction with a special form of make-and-break gear in the cylinders. The consumption of fuel on trial was about 0·7 pint of paraffin or petrol per brake horse-power per hour; the average number of revolutions per minute during this trial was 560, and the average brake horse-power 314·7. The total weight per four-cylinder set is 70 cwt.

It is obvious, from the consideration of the limitations of the internal combustion marine engine, that steam must continue for some time the principal, if not the only, medium of converting heat into work, at all events for large warships; but the question as to whether oil or coal should be utilised in the steam generators has been raised in a somewhat acute form during the past few months. Experience gained on searching steam trials of ships of various types, and on the service work of ships in squadrons, justified the belief that, on engineering as well as strategical and tactical grounds, oil fuel was greatly superior to coal. And yet the Admiralty have

Oil fuel.

finally arranged for the building of sixteen torpedo-boat destroyers, of about 900 tons displacement and 27-knot speed, in which coal only is to be used. This is solely because of the limitations of supply and cost of storage. We have lately added to the Fleet a considerable number of vessels using oil fuel exclusively; these are specially starred in the list of torpedo-boats and torpedo-boat destroyers in another part of this volume. The large destroyers consume 1000 tons of oil fuel per annum when in full commission, and in war times would burn enormously more. Many cruisers and battleships use both oil and coal, but in these oil is now only burned occasionally in "exercises." Even so, the aggregate consumption per annum is very heavy, and the increased provision made and being made for storage is not considered sufficiently adequate to justify the building of more vessels solely dependent on oil. That is the explanation, but it can scarcely be regarded as satisfactory. Either oil fuel increases fighting efficiency or it does not. If the gain justifies its use, adequate storage accommodation should be provided to meet all possible requirements in time of war.

It is easy to prove the superiority of oil fuel from the engineering standpoint. Its heat value, weight for weight, is quite 33 per cent. greater than Welsh coal; the rate of consumption may be higher and the steam capacity consequently greater for a given capacity and weight of boiler; there is not the same limit to the forcing of the boilers; there are no difficulties analogous to those involved by dirty tubes and clinkering of fires, which latter necessitates the putting of a coal-fired boiler out of service for an appreciable period every three or six hours, according to the degree of forcing. Thus, destroyers especially need a greater reserve of boiler power to maintain the speed for more than three or four hours with coal. The consequent addition to weight reduces speed and fighting efficiency. In fact, the 33-knot destroyers could not have been built on their displacement, and could not have maintained their speed for six hours without oil fuel as well as turbines. Further, each ton of oil requires only 38 cubic feet of storage, against 44 cubic feet per ton of coal, and for an equal volume of steam the ratio is 38 to 60 cubic feet. Oil fuel thus gives, either for the same space and weight, a greatly increased radius of action—quite 50 per cent.; or, if the space and weight saved were utilised otherwise, the fighting efficiency would be greatly augmented. The facility in renewing fuel supply in ships is also greatly in favour of oil. The smaller stokehold complement required reduces the necessary accommodation. A disadvantage of oil fuel is its cost, which is about 70s. per ton, against 20s. per ton of Welsh coal. The uncertainties of supply may

be overcome by adequate storage, and the practical benefits accruing from the use of oil as fuel justify a considerable capital expenditure in providing storage.

It will be recognised that in various directions there is great promise of development in the early future, notwithstanding that recent progress has been so marked. It is true that there are many difficulties in the way—some of them almost insuperable when considered from the purely theoretical standpoint; but there exists in the present, more than in the past, a great readiness to undertake research and experimental work, and the process of trial and error will in time eliminate impossible proposals, and encourage progress along the most feasible lines. The nature of the problems now calling for solution tends to lead the ingenious engineer towards original invention, and, fortunately, there is courage enough in the engineering department of the Admiralty, and, to a certain extent, in the Merchant Marine, to foster such originality. The present position of British constructive engineering may therefore be considered satisfactory.

ALEX. RICHARDSON.

CHAPTER VI.

THE ROYAL NAVAL VOLUNTEER RESERVE.

EVER since Napoleon said "Victory rests with the big battalions," countries have made an effort to maintain large and efficient reserves for their fighting forces, be they Navy or Army. In Great Britain, popular attention has mainly been focussed upon the re-organisation of our military resources; but, though less observed, Naval necessities have not been neglected, and the country is in possession to-day of a larger Naval Reserve than at any previous time in history since "Impressment" was abolished.

The Naval Estimates for 1907-08 provide for the following Naval Reserves :—

Royal Fleet Reserve,
Coastguards,
Royal Naval Reserve,
Royal Naval Volunteer Reserve.

It is with the last mentioned force that this article mainly deals.

The
R.N.A.V.

In 1873, a force composed of civilians was organised and drilled as a reserve for the Navy, and was called the Royal Naval Artillery Volunteers. The Act under which they were enrolled empowered the Admiralty to utilise their service "on board ship, or partly on board ship and partly on land, for defence of the coasts of the United Kingdom, Channel Islands, Isle of Man, and for service in adjacent seas." It will at once be observed that the principal object of this force was coast defence. Gradually Naval opinion reverted to the Nelson strategy, viz., that the prime duty of the British Navy is to seek out the enemy's ships and destroy them wherever they may be. This abolished with one stroke the theory that the training of the Navy should be directed towards coast defence. "The enemy's coast-line is the frontier of England" is a sound maxim, but it is one which sounded the death knell of the R.N.A.V.

The late distinguished and valiant sailor, Vice-Admiral Sir George Tryon, was appointed chairman of a special committee to enquire into the position of the Naval Reserves. In their report, which was submitted in 1891, the committee, while expressing the opinion that they did not doubt that the Volunteers would respond loyally to any calls made upon their services and would prove themselves as good fighting material as any foreign conscripts, came to

the conclusion that the force was not further required, and therefore not worth its cost of maintenance. The Royal Naval Artillery Volunteers were consequently abolished in 1892.

Six years later, in 1898, public opinion began to question whether there was not, after all, some use in the Fleet for civilians with Naval training, the more especially so since machinery had taken the place of spars and sails and ship work had become less the speciality of the sailor and more the craft of the skilled artisan. Added interest was given to the question by the incidents of the "manning" of the American Fleet, then entering upon the war with Spain. With a population of 75,000,000, the United States of America had an enlisted Naval force of but 12,500 men. By drawing upon retired men and others, the American trained *personnel* was brought up to a total strength of about 16,000 men. Between February and August of that year, 128 ships were added to the Naval service, and the complements of these ships were made up by drawing on the Naval Militias of the various States and by enrolling Volunteers specially for the occasion. By this means the total manning strength of the American Navy was increased to 24,123 men, and the effective service which these extemporised crews were able to render proved once again—if proof were really needed—that shipping men and civilians with a high standard of intelligence, and possessed of adaptability, can bear a useful part in war between Nations.

The
Spanish-
American
War.

From the time the R.N.A.V. were disbanded to the outbreak of the Spanish-American War, the British Admiralty had looked to the Mercantile Marine and fishermen to supply all needed reserves for the Navy; but their judgment and feeling of confidence received a rude shock from the facts laid before the House of Commons by the late Lord (then Mr.) Ritchie, President of the Board of Trade, when he moved the Boy Sailor Scheme in his Mercantile Marine Bill. Mr. Ritchie said: "In 1891, there were 41,590 British sailors on board British ships, but in 1896 there were only 35,020, showing a decrease of 6570 in five years. In 1891 the number of foreign petty officers and seamen on board British ships was 13,432; in 1896 the number had risen to 14,469, an increase of 1037, thus the decrease in British seamen in those five years was 15 per cent., while the increase in foreign seamen was 8 per cent. It was not an agreeable thing to know that no less than 30 per cent. of the petty officers and seamen on board British ships were foreigners . . . at present, if the Reserves were called out, the Mercantile Marine would be left almost entirely in the hands of foreign sailors."

The
Naval
Reserve.

The Naval
Volunteer
Reserve.

With the events of the Spanish-American War, and these facts concerning the manning of the Mercantile Marine in mind, it was not surprising that the British public should largely support the efforts of those who were working for the re-establishment of a Naval Volunteer Reserve. Public meetings were held in various shipping and industrial centres of the country, and a Petition was formulated to the Prime Minister, the late Marquis of Salisbury, praying that the scheme for the formation of a Naval Volunteer Reserve "might receive the urgent and sympathetic assistance of Her Majesty's Government." The Petition was signed by 450 representative authorities, including eight Lord Mayors of England, all the Lord Provosts of Scotland, and more than a hundred Mayors and Provosts of Cities, the remainder being members of Parliament and prominent public and business men. The Petition set out clearly what kind of force was aimed at. It said :—

"1. In the event of a great Naval war, the combined forces of the Royal Navy and the Royal Naval Reserve would not be sufficient to make good casualties during a prolonged struggle.

2. A great part of the Royal Naval Reserve, drawn mainly from the Mercantile Marine, will not be immediately available at the commencement of war.

3. *A force of 20,000 or more trained, or even partially trained, Volunteer gunners, to whom the routine and discipline of a ship of war would not be unfamiliar, by reason of short annual periods of training at sea, would be a better source from which to make good expenditure than recruits picked up at random by the offer of bounties, even if such recruits could be sufficiently trained in time to be of use in a national emergency.*

4. The establishment of such a Reserve of Volunteers should not, and need not, in any way prejudicially affect the Royal Naval Reserve. It would not be drawn from the same source, but from people living in coast towns and on tidal rivers, who have a strong predilection for Naval service and are unwilling to become 'soldier' Volunteers.

5. Such Volunteers should and would be prepared in the event of war to serve the Fleet in any part of the world, while the ordinary training would be had in the neighbourhood of each unit, with short periods of sea service in Home waters."

The Petition was presented in the Parliamentary Session of 1901, the result being that a special Representative Committee from among the signatories were summoned to the Admiralty to meet their Lordships and further discuss the matter. The South African

War had demonstrated unmistakably the utility and reliability of the country's Volunteer Forces, and it was urged that if civilians would give their voluntary services out of the country instead of merely at home, as this war proved they would, the most important objection to the continuation of the old R.N.A.V. had been rendered non-existent.

Following upon this meeting the Government appointed a committee, under the Chairmanship of Sir Edward Grey, to consider the whole question of the Naval Reserves. Much useful evidence was collected, and many of those who had worked hard for the resuscitation of the Naval Volunteer force were examined. Early in 1903 Sir E. Grey's Committee reported in favour of a Naval Volunteer force in this country, and, *inter alia*, said :—

Sir E.
Grey's
Com-
mittee.

"The experience of the Army has shown that large numbers of civilians take a pride in acquiring knowledge and discipline, and in training themselves for service in war. It seems to be both wasteful and unnatural that all the amateur talent in this country should, for want of opportunity, be obliged to turn to Military to the exclusion of Naval training, and in view of the expansion of the Fleet that may be found necessary in a struggle for the supremacy of the British Empire at sea, the Committee cannot but think that a body of Volunteers would be likely to prove a most valuable auxiliary branch to the *personnel* of the Navy in time of war."

On June 30, 1903, there was enacted in Parliament "The Naval Forces Act," which provided for the constitution of a Royal Naval Volunteer Reserve. This measure may be said to have put the coping stone on the previous five years' agitation, and, since its passing, all energy has been directed towards organising and training a really efficient and useful fighting force.

The
Naval
Forces
Act.

The first event was the receipt of a Minute from My Lords of the Admiralty stating that they expected Naval Volunteers to comply with the following two essential conditions :—

Admiralty
condi-
tions.

"(1) To serve anywhere in time of war where the Admiralty may have need of their services.

(2) To do any duty for which they may be found to be competent on board the ship to which they may be posted, which the Commanding Officer of that ship requires of them, and generally to be prepared unreservedly to accept the liability of serving under the provisions of the Naval Discipline Act."

These conditions have been unreservedly accepted, and well it is so,

because it is obvious that if "the sea is all one," and "the Empire is all one," a Fleet tied to Home waters is useless. The Navy must be prepared to go anywhere and to do anything if it is to be of any good in Imperial defence.

Concerning the *personnel* of the new Naval Volunteer Force, their Lordships proclaimed :—

"As regards the man, neither previous knowledge in gunnery nor previous service at sea will be regarded as a necessary condition for entering the force, although every branch of technical knowledge will be welcomed and utilised. The only tests for entry will be in respect of character and physique."

This was wise, as it differentiated the source of the Volunteer recruiting from that of the Mercantile Marine Naval Reserves, and so prevented interference the one with the other. All precedent as to organisation and administration of the Royal Naval Volunteer Reserve, as the new force was called, was abandoned; and it was decided to appoint a committee of civilians interested in the movement to work the scheme. A Naval representative was appointed to the Board, and its decisions and actions were made subject to the approval of the Admiral Commanding Reserves as directly representing the Admiralty. It speaks well for this bold departure that the civilian administration, under the able Chairmanship of Mr. C. E. H. Chadwyck-Healey, C.B., K.C., is still in existence, and has been the model upon which the Administrative Board for the new Territorial Forces was based. The advantage of delegating the administrative duties to civilians under immediate Naval control instead of entrusting the work to a Government Department is that, while the Admiralty are in the position to dictate the actual requirements of the Service, the civilians are in touch with the different parts of the country and, by their local knowledge, can dovetail these Naval requirements so as to suit civilian life without causing great inconvenience to those who volunteer their service but have other calls upon their time.

Organisa-
tion of
R.N.V.R.

The R.N.V.R. has been divided up into six Divisions (1) The Thames, or London, Division, under command of Commander the Hon. Rupert E. Guinness, C.M.G.; (2) The Clyde Division—Commander the Marquis of Graham, C.V.O.; (3) The Mersey—Commander the Right Hon. The Earl of Lathom; (4) The Tyneside, or Newcastle, Division—Commander E. W. Lloyd, R.N.; (5) The Sussex, or South Coast, Division—Commander the Right Hon. Viscount Curzon; and (6) The Bristol Division—Lieut. the Hon. C. A. Ward, R.N., M.V.O.

The establishment strength of these Divisions has, in the mean-

time, been fixed, and the following figures show their present strength :—

Name of Division.	Establishment Strength as fixed.	Present Strength.
1. London	1,000	858
2. Clyde	1,000	963
3. Mersey	700	580
4. Tyneside	600	457
5. Sussex	500	430
6. Bristol	400	296
Total	4,200	3,584

For the maintenance and training of this Force, Parliament voted, according to the Naval Estimates for 1907–08, £23,950, which works out at about £6 per Volunteer as compared with £10 per Royal Naval Reserve man and £200* per A.B. of the permanent strength Royal Navy. The fixed establishment of a Division as to ranks and ratings is as follows :—

	Company.	Division of Five Companies.
Commander	—	1
Commander instructor	—	1
Sub-Lieutenant	2	10
Staff surgeon (honorary)	—	1
Surgeon	1	5
Paymaster	—	1
Assistant Paymaster	—	1
Chaplain (honorary)	—	1
Midshipman	1	5
Total commissioned officers	4	26
Chief petty officer	1	5
Chief petty officer instructor	1	5
Armourer	—	1
Bugle major	—	1
First class petty officers	4	20
Leading men and men	92	460
Buglers	1	5
Total enrolled, including } commissioned officers }	108	523

Several of the divisions are composed of “Headquarter Companies” and “Outlying Companies,” and in this way tap a larger recruiting source than at first might be apparent. “Outlying Companies” are existent in the following places :—

London	Nil	Nil.
Clyde	{ Greenock	2 Companies.
	{ Dundee	” ”
Liverpool	{ Birkenhead	” ”
	{ Southport	1 Company.
	{ Hebburn	” ”
Tyne	{ North Shields	” ”
	{ South Shields	” ”
Bristol	{ Barnstaple	” ”
	{ Brighton	” ”
	{ Newhaven	” ”
Sussex	{ Hove	” ”
	{ Hastings	” ”
	{ Eastbourne	” ”

* Viz., the total estimated cost of training a boy for three years; the average annual cost being from £60 to £70.

At first, most of the drill was performed in the R.N.R. Batteries, but as some of these have been abolished and others have proved inconveniently situated, the Volunteer divisions have now acquired premises of their own, and in some instances they are fortunate in possessing a drill ship.

All the Volunteer premises are kept up entirely at the expense of corps funds, which are earned by the men themselves. Each division has also arrangements for carrying out rifle shooting at a range; and has lent to it a Service 32-ft. cutter, on the allowance of one boat for each company, in which boat sailing and rowing is practised. The London companies and the Dundee companies have a Service steam pinnace allocated to their quarters, this being essential for safety on account of the strength of the tides in the Thames and Tay.

Training
and drills.

The system of training the R.N.V.R. has been considerably developed, and all the instructional staffs, officers and C.P.O. instructors are drawn from the Active List. The regulations provide for the following minimum drills: To qualify for an "efficient," every officer and man must attend at least 40 drills during the first year, and be present at the annual inspection. Efficients must requalify annually and attend at least 24 drills during the year. The divisions, or outlying companies, are, for purposes of drill, divided up as far as possible on a ship's company basis—that is to say, into quarter-deck, maintop, foretop and foc'sle divisions, with a signal division; and these again into sub-divisions as per an ordinary "watch-bill." A system of drill has been worked out and embraces training of the following nature: Drills for Q.F. guns and rifles used in the Royal Navy, with firing practice from such weapons as is found practicable; loader drill, deflection teacher, field-gun drill, shear-legs drill, company drill, and sufficient battalion movements to enable the men to take part in parades with other forces; seamanship, including handling boats under oars and sails, knotting, splicing, both hemp and wire, signalling and telegraphy, and lectures on guns, ammunition, etc., together with such other drills as the Admiralty may from time to time direct.

Courses.

Much the most important features of the Naval Volunteers training are the "courses" at the Naval gunnery, signalling, torpedo or engineering schools, and the periodical embarkations with the Fleet. The short courses are of a fortnight's duration and embrace at least ten working days. A man going through a course receives pay and allowance according to his naval rating, and on passing a satisfactory test examination earns for his division a proficiency

grant of 30s. per annum, but to retain this he has to requalify once every three years. In respect of telegraphy the pro-efficiency grant is £4 instead of 30s.

In addition to these courses in general training, there are special courses for men wishing to obtain trade certificates. It is much to be desired that the skilled artisan should become a member of the R.N.V.R., especially those with a thorough knowledge of trades likely to be useful on board ship—for instance, engine-room artificer, electrician, blacksmith, carpenter, cooper, painter, plumber, caulker and shipwright. Volunteers wishing to qualify for a trade certificate have first to pass an educational and theoretical test examination at their headquarters. They then get a provisional certificate, and are sent to one of H.M. Naval establishments for a fourteen days' course. On passing out successfully, a man is granted a trade certificate, and should he be called upon in future to work at his trade whilst embarked with the Fleet, he receives a special allowance of pay according to scale, thus :—

Courses
for trade
certifi-
cates.

Engine-room artificer, 1st class	6s. per day.
Electrician	5s. 6d. "
Blacksmith's mate	2s. 9d. "
Carpenter's crew	2s. 4d. "
Cooper's crew	2s. 6d. "
Painter, 1st class	3s. "
Plumber's mate	2s. 5d. "
Shipwright	4s. "

Each year a certain number of embarkations with the Fleet are permitted, and these are arranged as far as possible to suit the convenience of the men in the various divisions. The practice has been to draft the men embarking from a division to a certain port, and, on arrival there, to split them up into detachments and send them on board the various ships of the Fleet. Once on board, the men settle down in messes by themselves, and from day to day are "turned up" to take part in ship routine or instruction as may seem most beneficial. As proof of how greatly this insight into Naval life is appreciated, it may be of interest to quote the numbers of men embarked during the last three years :—

Embarka-
tions.

Year.	Men Embarked.	Percentage to Total Strength.
1906	970	26%
1907	920	27%
1908	1,000	26%

Apart from these regular embarkations there have been one or two exceptional opportunities of going afloat. When Vice-Admiral H.R.H. The Prince of Wales went to Canada for the Tercentenary Celebrations, he was accompanied by a special squadron, and the R.N.V.R. furnished 5 officers and 136 men as part complement of the

ships. At the Royal Review at Quebec, the R.N.V.R. men marched past after the field-guns with drawn cutlasses, and thus added a pleasing aspect to an historic occasion.

Cruises of
Clyde
Division.

During the summer of 1907, the Clyde Division, R.N.V.R., manned one of the old Coastguard yawls, H.M.S. Rose, and sailed her from Chatham to the Clyde. Again during 1908 the same division carried out a series of experimental cruises, covering more than 1700 sea miles in H.M. gunboat Rattler, which was the first ocean-going vessel to be propelled by gas-engines. Altogether, 250 men and 12 officers took part in these cruises. During Fleet embarkation, the volunteers receive naval pay and allowances according to the rating held.

The universal kindness and attention of the officers and men of the Royal Navy towards the Volunteers has been much appreciated, and the keenness of the R.N.V.R. men in their work is greatly due to the encouragement given them by their colleagues of the permanent strength.

Extra
drills.

Many R.N.V.R. men put in a great many more drills in their batteries than the regulations prescribe. For instance, the following record shows the number of attendances at drill quarters put in by the best three men in the following divisions:—

Division.	Men.	No. of Division.	Division.	Men.	No. of Division.
London	A	505	Mersey	A	256
	B	504		B	255
	C	388		C	244
Tyneside	A	203	Sussex	A	438
	B	201		B	347
	C	152		C	236
Clyde	A	264	Bristol	A	158
	B	248		B	144
	C	216		C	122

These drills are exclusive of embarkation with the Fleet and short courses at the Naval Schools.

Inter-
Divisional
Competition.

Every year an Inter-Divisional Competition is held at the Naval Signalling School on board H.M.S. Victory, for a cup presented by Hon. Commander C. E. H. Chadwyck-Healey, C.B., K.C., Chairman of the Admiralty Volunteer Committee. Divisions of ten companies send a team consisting of six men, those of seven companies a team of four men, and those of five companies a team of three men. The following shows the comprehensive demands of the competition, and also gives an idea of the efficiency demanded in the training of the men. The subjects required are:—*Scaphore* (rate twenty words a minute) fifty words of prose. *Flag-waving* (rate twelve a minute), twenty-five words. *Flashing* (rate ten a minute),

test message naval signs, and thirty words of prose. *Telegraphy* (sounder) prose, five minutes (rate twelve a minute). Additional marks are also given for style in all the above. There is also an oral examination on colours of Naval and international code flags, heliograph, use of telescope, and general duties of a signalman. The cup is won by the division whose team obtains the highest marks; and for the last two years it has been carried off by the London Division.

One of the most beneficial Acts of Parliament that has been passed to assist the R.N.V.R. is the Naval Lands (Volunteers) Act. By this piece of legislation, Divisional Finance Committees are empowered to borrow money from the Public Works Loans Board at moderate interest for the purpose of erecting and equipping efficient drill quarters.

The principal is repayable by instalments over a long period, viz., thirty years, and thereby the funds of a division are relieved of an immediate heavy strain. It cannot be doubted that suitable working premises are of the utmost importance for the training of the men, especially in view of the fact that the men have so little time in which to learn so many subjects.

It is too often the idea that because a man is in the Reserve the less money should be expended upon his training, and that the outlay should be reduced according as to whether the Reserve is the first, second, or third in line. Matters should be in just the reverse order. The smaller the amount of training given, the more up-to-date the appliances should be, for every short cut must be taken to attain practical efficiency, and these invariably cost money to provide and arrange.

The R.N.V.R. have a great grievance in the matter of kit equipment. At first they were promised a "free kit" on enrolment, all renewals and up-keep to be borne by the Volunteers themselves. It has, however, often been shown that the harder a man works the more wear and tear his clothes receive, and consequently the greater the burden of expense entailed upon him. The policy as it stands puts a premium on idleness. Vague statements in favour of granting free renewals or of placing the Naval Volunteers on the same favourable footing as their colleagues in the Territorial Forces have been made from time to time, but the question has gone on being debated and referred, and referred and debated, for nearly three years, and seems yet as far from solution as ever. If the country has to put its trust in voluntary service and can find men patriotic enough to give time to train themselves for the "great emergency," surely it is not asking too much that they

Naval
Lands
Act.

Grievance
as to kit.

should be *given free* the clothes and renewals which it is necessary for them to have for their work.

Necessity
for
training
at sea.

To put the training of the R.N.V.R. on the most efficient footing, every encouragement should be given to actual work at sea. There is no question but that the distressing malady sea-sickness and the strangeness of sea routine and new surroundings much handicap the men in their work during first days afloat. There will be no time to acquire the ways of the sea in a Naval war. These things should be sought now in the time of peace. Each division of the R.N.V.R. should possess a small gunboat of its own, which could be utilised at week-ends, and all other times suitable to the Volunteers, for carrying out actual sea training. It is not every man who can spare annually a week, fortnight, or month for embarkation with the Fleet, yet there are few who would not gladly spend a couple of days from time to time in learning practical ship-work and carrying out Naval evolutions and routine under realistic conditions. It is an absurd thing to see grown-up men place a "collision mat" over the front door of a brick house from the second storey window; yet this evolution recently constituted an actual part of the Admiral of Reserves' Inspection of the R.N.V.R., and was favourably reported on as a test of "Naval efficiency" to their Lordships. Very different in value of training was the clearance of a foul anchor at midnight in half a gale by the volunteer crew of H.M.S. Rattler. The one was a farce and the other was practical work. There are a large number of old gunboats and second-class cruisers on the Special Service or Sale List of the Navy, and it would seem that they could be put to better use than lying up in unfrequented lochs or out-of-the-way places.

Boys'
Naval
Brigades.

A Boys' Naval Brigade is affiliated to both the Mersey and Clyde Divisions. This is a step in a new direction, but it is hoped that many boys of good character who have an inclination for the sea will enrol, and by widening their knowledge and accustoming themselves to discipline finally elect to join the R.N.V.R. It is the same with the auxiliary forces as with the senior service; the younger the age at which Naval life is entered upon, the better a man-of-war's-man is turned out. Whatever may be the ultimate aim of a Naval Volunteer, the R.N.V.R. movement cannot fail to benefit the country, for it brings the "people" into direct touch with the first line of defence, and to that extent teaches them the necessity of maintaining British sea supremacy at all costs.

Naval
Volun-
teers in the
Colonies.

The Royal Naval Volunteer movement is one which has already taken root in the great colonies of the Empire. Australia, India, South Africa, have all Naval Volunteer Brigades. Though not

formed on exactly similar lines to the United Kingdom Reserve, the members are excessively keen in their work, and have always been well reported upon in respect of their drill. It is only right to say that these distant corps are much handicapped as regards efficient and up-to-date Naval training by reason of the small encouragement given to them by the Admiralty at home. They are starved of up-to-date weapons, and possess no proper drill ships. Their training staffs are not on the Active List, and consequently they are not in touch with the Imperial service proper. It is to be desired that in the near future "My Lords" will see their way to meet the wishes of the colonial statesmen, and do all that is within the power of Naval administration to co-ordinate and encourage the establishment of R.N.V.R. forces in Greater Britain.

Naval Volunteers have in the past rendered good service to the Empire. In the Egyptian campaign of the eighties, three officers and fifty men from the United Kingdom were landed and took part in active operations. In the Maori wars and Zulu wars, Naval Volunteers took part in large numbers. In the recent Boxer troubles in China, Australia sent over 260 Naval Volunteers to fight. In the late South African war, Natal's Naval Volunteers did much good work both in and out of Ladysmith. Given the same opportunities, and properly encouraged, there is no reason why the present members of the R.N.V.R. should not emulate afloat, and equal, if not surpass, the creditable performances of their predecessors in Naval service.

GRAHAM,

Commander, R.N.V.R.

CHAPTER VII.

THE NAVAL EXPANSION OF GERMANY.

"Jeder Tag zeigt uns von neuem, wie eine gedeihliche Entwicklung des Vaterlandes ohne nachhaltige Wirkung seiner Macht zur See nicht denkbar ist."—The German Emperor, New Palace, Potsdam, December 11th, 1902.

THE growth of the German Navy is for the British Empire the most significant fact in the recent history of the world. Forty years ago Germany was no more than a geographical expression, but her powerful states awaited the supreme moment when they should be welded together by high statesmanship into one of the great Powers of Europe, distinguished above all others by its vast military organisation, and the spectacle that it presents of a nation trained to arms. Its military system has been extolled as the very type and exemplar for the organisation of our own. The regeneration of Prussia after the disasters of 1806, by the great soldiers who shaped the steps of progress, and the demonstration of organised efficiency in subsequent wars, had impressed Europe with the conviction that in the countries of Germany, and more especially in Prussia, the true secret of military efficiency was known. But those who look back even twenty years remember that the German people betrayed even then no instinct for the sea. All their trust was in the Army, which was a part of themselves. Some prescient persons, like Prince Adalbert of Prussia and Albrecht von Stosch, knew, nevertheless, that Germany had also her place at sea, but for the mass of the people, and for their representatives in the Reichstag, there was no consciousness of the necessities of the Navy that was beginning, and time after time the sums demanded for the building of vessels were struck out of the estimates by majorities distrustful of the purposes of the Government. Since that time we have witnessed a revolution both in German public opinion and in the views and, in some measure, of the objects of the Government, and a work is being accomplished which has had no parallel since the time of Colbert. No longer content to be a powerful military state, Germany is resolved to rank with the great maritime Powers of the world, and the German Government has told our own, as Mr. Asquith has explained in the House of Commons, that the German shipbuilding programme is to suit the needs of Germany, "and will not be influenced by anything that we may do." *

* House of Commons, Feb. 18th, 1909.

German
Naval
policy.

It used to be said that the Navy was a hobby of the German Emperor's, and it has often been asserted that Germany is impelled to her naval expansion by some active hostility towards ourselves. To assert either of these things is to misunderstand the conditions altogether. Nations are moved by economic necessities infinitely more than by national antipathies, which, indeed, as all history shows, are the result, and not the cause, of the conflict of interests and the clash of arms. The German Emperor, in proclaiming his conviction that the future of Germany lies on the water, and that a fleet is her bitter need, expressed a fundamental truth, and the untiring energy with which he has laboured to bring home to his people the objects he has in view, which are their own objects more than his own, has been crowned with complete success, and has won the unstinted admiration of Englishmen. He has proved that he possesses the power of inspiring and leading a nation, and his mistakes are forgotten in the contemplation of what has been accomplished. The German Navy is becoming an immense potentiality. The object is stated in terms that admit of no misunderstanding in the preamble to the Navy Law of June, 1900. There is only one means, we are told, of protecting Germany's sea trade and colonies, viz., that she must possess a fleet of such strength that, "even for the mightiest Naval Power," a war with Germany would involve such risks as to jeopardise that Power's own supremacy. For this purpose, it was explained, the German Fleet should not necessarily be as strong as that of the great Sea Power implied, because, in general circumstances, such a Power would not be in a position to concentrate all her forces against Germany, and even if she should oppose a superior force to the German Fleet, the consequence to herself would be such a considerable weakening of force that even if she proved victorious her supremacy would not for some time be effective. This plan has been assumed to express some active hostility towards this country, but the truth, as Germans are never tired of repeating, is that the object is to provide security and defence for German commerce and enterprise. They recognise at the same time, as Mr. Asquith said on the occasion referred to, that "it is natural for us to take what steps we think necessary to protect our own interests."

National
interests
and
Naval ex-
pansion.

At every step in the increase of the German Navy within the past ten years, its close relationship to national interests has been expounded and enforced. When the scheme of November 30th, 1897, was introduced, it was accompanied by a report on the maritime interests of the German Empire, and a statement of the expenditure on the Fleet and the Army compared with the like expenditure by other Powers, and with the new Navy Law, promulgated on April 10th,

1898, there were issued statistics of the increase of German interests at sea from 1896 to 1898, and a report of the Budget Committee on the investment of German capital in foreign countries.* These statements were directed to show the consequences of the emigration of Germans for German commerce, the comparative share of German over-sea trade in the total volume of trade, the commerce of German harbours and of German ships in foreign ports, shipping interests, shipbuilding, business establishments in German ports, deep-sea fisheries, telegraphic cables, German interests in foreign countries, colonies, the official representation of German commerce abroad, and preparations for the defence of German interests. With the same object of showing the reasons for the demands made upon the Reichstag, the Imperial Navy Office prepared a supplement to the *Marine Rundschau* in 1905, entitled, "Die Entwicklung der deutschen Seeinteressen im letzten Jahrzehnt." This last publication contains a mass of figures and statistics dealing with all manner of subjects connected with German commerce, over-sea trade, and foreign possessions.

It is shown that in the period 1901-4, 108,857 Germans went to the United States, 2257 to Brazil, 2208 to other parts of America, 473 to Africa, 10 to Asia, and 702 to Australia. Figures are also given to illustrate the immense increase of German maritime commerce. While over-land trade with countries of the Continent increased in 1894-1904 by 48 per cent., over-sea trade with European countries increased 68 per cent., and with countries outside Europe 93 per cent. Within thirty years the population of Germany increased from 41 to 58 millions, and where there were before four Germans there are now six or seven. The excess of births over deaths within five years numbered 800,000. On the other hand, it has been shown that the emigration of Germans in the nineteenth century lost to the country not less than six million persons. "Nauticus" remarks in one of his *Jahrbücher* that the sons of Germany are in all ports and trade centres, and are competing successfully in the markets of the world, and gaining their place in countries where the commerce of other countries was formerly supreme. German enterprise is founding commercial enterprises in many parts of the world, and the German mercantile marine has increased with great rapidity. *Unsere Schifffahrt spann ein dichtes Netz um den Erdball.*

* Reichstag, 9th Period, 5th Session, 1897-98, Nos. 5 and 107; 10th Period, 1st Session, 1898-1900, No. 458. Report of the Committee on the Imperial Estimates on the proposed addition to the Navy Law of November 10th, 1898. Reichstag, 10th Period, 1st Session, 1898-1900. No. 263, Appendix D.

It should be recognised that the Germans are not a warlike people, and that they have much to lose by war, even if they should be successful in it. But, like old Phœnicia, like Holland, and like our own country, Germany is impelled to expansion outside the bounds of her own frontiers by economic necessities, the increase of her population and the demand for outlets for her enterprise and commerce. It is this consciousness of necessity that impels the Germans to embark upon a policy of great naval expansion. Into economic questions and the problem of tariffs there is no purpose of entering here, but whatever may be the cause of the change in the relative positions of England and Germany, there can be no doubt that, while a certain decline may be noticed in the industrial activity of Great Britain, Germany is becoming more and more an industrial nation. In 1906 the German production of steel was 11,135,000 tons, while Great Britain produced less than 6,500,000 tons, these figures showing a complete inversion of the situation that existed a quarter of a century earlier. Germany is importing raw material upon a larger and larger scale, and exporting greater quantities of manufactured articles—both practically doubled within about ten years—and this industrial development is still progressing with great rapidity. The demand for foreign markets is urgent and imperative. The large extension of the internal waterways of the country, the vast development of the port of Emden, and other measures which are likely sooner or later to reduce the importance of Amsterdam and Antwerp, and to bring Holland and Belgium within the German Zollverein, are marks of changes now going on. Nor can we forget the hidden influences which may ultimately tend to the disruption of the Austro-Hungarian monarchy, and the inclusion of the German-speaking Austrians, and the parts of the country they inhabit, in the German Empire, thus giving to Germany a possible future outlook upon the Mediterranean. It must be noted, moreover, that German foreign markets are now singularly precarious. They depend, if one may so express it, in great measure upon the goodwill, or at least upon the commercial policy, of the countries which are receiving German exports. A new tariff or fresh commercial restrictions may exclude manufactures from markets abroad, as Germans are well aware, and they also entertain great apprehension as to a possible limitation of the supply of their raw materials. German workmen are alive to the dangers, and in the *Arbeiter-Zeitung* and the *Sozialistische Monatshefte* their leaders have shown the conditions that might possibly follow. These facts are adduced in order to make clear how intimately bound up is the industrial position of Germany with foreign trade, and consequently with the expansion of the German Navy.

Impelling
causes.

The serious and settled purpose with which Germany is pursuing her Naval policy is shown by her increasing outlay in the face of great financial difficulties. The Prussian deficit in 1907 was £3,590,000; that of 1908 was expected to be £8,250,000; that of 1909 is estimated at £7,800,000. These deficits will have to be covered by loan, and no attempt is being made to cope with Prussia's prospective obligations to the Empire in the way of deferred "matricular" contributions. There is urgent need of reform in the Imperial finances, and Prussia cannot meet any further claims of the Empire except by raising loans, which were never contemplated by the authors of the constitution. It is anticipated that £25,000,000 of new taxation will be required annually for the next five years.

Naval
and
Military
burdens.

In no country save our own, and in no time before our own, has a great Power been able to maintain with success her position as a strong Naval Power and a strong Military Power at the same time. The military preoccupations of the Spaniards were very largely the cause of their naval unreadiness in 1588, and it was military pressure that ultimately led to the decline of the Netherlands as a Sea Power. A double burden is now borne by Japan, but the conditions prevailing in the Far East are not strictly comparable to those existing in Europe, and Japanese naval and military outlay per head of the population is much less than half that in Great Britain, Germany, or France. It is the wealth of Great Britain that has enabled her so far to bear a stupendous taxation for Imperial Defence, in which military expenditure counts for a sum approaching that devoted to the Navy. Whatever the financial resources of European countries may be, there lies inevitably before Germany the need of maintaining her great Army as well as the Navy she is developing. The wealth of the country has largely increased, and however serious may be the burden, nothing will be stinted on the Army or the Fleet. Upon her military expenditure in 1909-10 she does, indeed, hope to save something more than £1,000,000, but the margin is small, and the reduction is strongly opposed. The following table from the "Nauticus" Year-books shows the growing expenditure of the German Empire upon her naval and military forces, and the estimated cost per head of the population during the last eleven years. The military outlay includes that of Bavaria, and the naval expenditure is exclusive of that for Kiao-chau, except for the central administration.* It is significant to compare these figures with those of 1873, when the

* The sums given are converted (at £1 = 20·43 marks) from the round figures in thousands of marks included in the "Nauticus" table, and therefore do not correspond exactly with the Estimates. The calculation of expenditure per head of the population appears to be based upon census returns of numbers which latterly are shown to have increased rapidly.

Navy Estimates amounted to £1,300,000. Even in 1888 the total was only £2,500,000.

	Army.	Navy.	Total.	Per Head of Population.
	£	£	£	s.
1898-9	30,969,799	6,167,107	37,136,906	22·6
1899-1900	31,558,395	7,117,082	38,675,477	23·4
1900-01	32,111,160	7,702,691	39,813,851	28·3
1901-02	34,152,325	9,539,500	43,691,825	29·9
1902-03	33,733,237	10,051,688	43,784,925	29·6
1903-04	32,303,964	10,407,635	42,711,599	33·1
1904-05	31,672,332	10,110,377	41,783,309	32·1
1905-06	34,171,610	11,335,410	45,507,020	29·7
1906-07	36,341,360	12,328,928	48,670,288	29·4
1907-08	39,543,955	13,604,895	53,148,850	28·0
1908-09	41,786,295	16,604,700	58,390,995	28·1

In 1909-10 the total naval expenditure is £19,594,969; in 1912-13 it will have increased to over £21,980,000.

The considerations which precede point to the inevitable conclusion that the Naval policy of Germany does not depend upon the personality of the Emperor, nor upon the views of particular German ministers, nor upon any passing phase, excitement, or exaggeration of public opinion. It is pursued, without change or hesitation, notwithstanding the great difficulties which it entails, and the serious burdens which it lays upon the people. It is based upon the ground of national necessity, and upon those unquenchable impulses which have driven other countries in the same circumstances to seek outlets for their energies and fields for their enterprise in countries outside their own, to which they have sent the produce of the labour of their sons, and from which they have drawn in return their wealth, and many of the means for increasing it, in the shape of the raw materials which are the life-blood of manufacturers. Germany does not desire war; she has nothing to gain and much to lose by it; but she demands the things that she needs, and will fight for them if they cannot otherwise be obtained. As we read in the sayings of Suntszu, the Chinese "Master of War," who wrote five centuries before the Christian era, "to fight and conquer one hundred times is not the perfection of attainment, the supreme art being to subdue the enemy without fighting." To obtain the objects of war by preparing for it, and without fighting, is, in this spirit, the legitimate object which Germany has in view. We cannot expect the Germans to cease from developing their naval resources; yet it would be poor statesmanship to ignore the possibility of a conflict of interests, or to suppose that industrialism and commercialism are less potent factors in provoking hostilities

German
objects.

between nations than were the dynastic quarrels of former times. It is the highest interests of both countries that good relations should be maintained, and the German Emperor, when he visited the Guild-hall in 1891, and on other occasions, has expressed his desire to preserve the peace of the world unbroken. All that he has said has been re-echoed and emphasised by King Edward in Berlin. But the Emperor did not imply, nor could he have implied, that the policy of his country had undergone any change. He knows, as do German statesmen, that Germany cannot speak aloud in the affairs of the world unless behind her diplomacy is the strong, long arm of naval power. Prince Bülow, in his capacity as Minister-President of the Prussian Diet, speaking on January 19th last, showed that no change has passed over the views of the Government on the subject of naval defence. "For the foundations of our welfare and our greatness, of our might and our security, for the Army and the Navy," he said, "it is the best that is just good enough. We cannot, and dare not, save money at the expense of our readiness for battle and the peace of the country; our geographical position is too unfavourable for that."

Germany
and the
two-
Power
standard.

This significant statement was made subsequently to the public declaration of policy of the British Prime Minister on behalf of the Government that he accepted the two-Power standard of naval strength as meaning a "preponderance of ten per cent. over the combined strengths in capital ships of the two next strongest Powers." A great impression was caused in Germany by this unequivocal statement, and an inspired writer, "v. R.," in the official *Marine-Rundschau*, said, in discussing the question, that Germany was witnessing the opening of a new stage in British naval policy. The Liberal Government had assumed as its own the attitude of its predecessor, and was supported by public opinion. The object of the writer was to question or dispute the basis of that standard. He declared once again that the German Navy was solely for the defence of German interests, while we were prepared to make England superior to any two Powers in all circumstances and at all times. He averred that a serious doubt was raised as to the standard by introducing the phrase "capital ships," and the argument was apparently directed to induce us to establish the standard upon the basis of the power of ships and not upon their number. Again, he urged that we should consider our superiority as consisting in part in the single direction to be given to our Fleet, as contrasted with the dual control of an allied fleet that would be opposed to us. The strength of our individual ships and the inherent weakness of a coalition were the arguments adduced to suggest to us a smaller basis

for the translation of our formula into terms of capital ships, and he did not hide from his readers his contention that, though we were building a two-Power Navy, we were, in fact, under the ineradicable belief that German naval preparations were directed solely against ourselves. To this it might be answered that it is for the Board of Admiralty to advise the Government both as to the number and character of the ships required to establish and maintain the standard adopted, and that whether the British and German Fleets are actually built to encounter one another or not, it is certain, if they should ever come into collision like the brazen and earthen pots floating down the stream, that the weaker would sink on impact with the stronger.

With this thought in their minds, no doubt the Germans are increasing their fleet at a surprising rate, and building "capital ships" intended to rival, in every respect, their British prototypes. There is no finality in the present situation. German policy is disclosed in successive steps of naval development. The present programme is declared by many German writers to be inadequate, and the German Navy League is urging a further increase. It is maintained that the limit of age of capital ships, placed at twenty years, is too great, and the consequence of the adoption of such a view would be a fresh acceleration of the pace of construction, and an increase in the number of ships without altering the programme, in the sense that a reserve of ships would be formed, which, if no longer new, would still possess considerable fighting value.

Rapid expansion of the German Fleet.

What is best worth noticing in this progressive expansion is the thoroughness, consistency and confidence with which it has been pursued. When the time came for adding cruisers to the programme, they were added, and when the greater power of capital ships became evident, the financial provisions of the scheme were augmented. The evolution is not in the material of the Fleet only. The provision of larger shipbuilding resources, the improvement of the ports and harbours, the construction of slips and docks, the increase in the working-power of the naval establishments—all these have kept pace with the larger requirements of the growing fleet. The Kaiser Wilhelm Canal is to be widened and deepened to admit of the passage of the largest vessels, and the charges will not be laid on the Naval Department. The expansion is universal, and touches every side of German naval life and activity. It does not end with the enormous development of the ports, in communication by internal waterways with the great industrial centres of the country. *Pari passu* with the growth of the Government establishments, we find an enormous advance made by private shipbuilding yards and factories,

Thoroughness of German methods.

which, by sane and judicious measures, are all provided with an abundance of work that strengthens and develops subsidiary industrial establishments throughout the country.

The
German
Navy
Law.

The present development of the German Navy may be said to have begun with the intended Septennate of 1898-9-1904-5. In 1897 two cruisers and other vessels had been struck out of the Estimates, notwithstanding the insistence of the Government. But the change in public opinion had begun, and the Septennate was converted by the action of the Clerical Party and the Budget Committee of the Reichstag into a Sexennate to conclude in 1903-4. There were to be seventeen battleships for the two squadrons (including a squadron flagship), eight coast defence ships, six large and sixteen small cruisers for the Home Squadron, and three large and ten small cruisers for foreign service, besides a reserve of three battleships and six cruisers. The *Lebensdauer*, or active life of a battleship or coast defence vessel, was reckoned at twenty-five years, of a large cruiser at twenty years, and of a small cruiser at fifteen years, and twelve battleships and a number of cruisers existing at the time were accepted as part of the establishment. The wise procedure of providing officers and men upon a fixed scale was introduced, ensuring a fifty per cent. excess for ships abroad, full complements for ships of the active formations at home and for half of the torpedo flotilla, and nucleus crews for the remainder, with a five per cent. surplus for the whole of the *personnel*.

But this scheme, though presented as of definitive character, was short-lived. Kiaochau had been occupied, the winged words about the "German Michael" and the "mailed fist" had been uttered, and the country was ready for a larger measure. Accordingly, in 1900, the new Navy Law, covering the period up to 1916, was promulgated, with the declaration that for the protection of national interests, and more especially of foreign commerce, Germany required peace—"not only upon land, but upon sea; not, however, peace at any price, but peace with honour." Into the details of the Navy Law it is unnecessary to enter here. The effect was to provide two double squadrons of battleships instead of the one double squadron of the Law of 1898-9, with the essential auxiliaries of cruisers and torpedo craft, and, in addition, a reserve of four battleships and certain cruisers. It was said in the Memorandum that a war touching commercial interests was likely to last long, and would "last longer according to the object of the superior enemy," to whom the war might cost little, while to Germany it might mean the destruction of her maritime commerce and the loss of her colonies, and "a commerce once destroyed is difficult to recover." It was pointed

out that the scheme drafted in 1897, and then to be superseded, had for its immediate object merely to ensure the execution of the programme dating back to 1873 (which had been retarded by the action of the Reichstag), and to limit the number of vessels to the requirements of the double squadron intended by the Law. The new programme involved the making of provision for another double squadron, and the significant remark was made, in the preamble to the new Navy Law, that Germany would still be inferior to other great Powers, and therefore that endeavours "must be directed towards compensating this superiority by the individual training of the crews, and by tactical training by practice in large bodies." The total material establishment, exclusive of a reserve of four battleships and three large and four small cruisers, was thirty-four battleships, eight large armoured cruisers, twenty-four small cruisers, and eighty torpedo-boats, and an additional requirement was six large and seven small cruisers for foreign service and a reserve for that service. "A sufficient force on the spot, supported by a strong fleet at home, will, in many cases, avert differences, and thus also contribute towards the maintenance of peace, with a proper care for German honour and German interests." When the measure became law, however, the provision was for three large and ten small cruisers only for foreign service.

The adoption of this scheme involved the building of 46 large ships—substitutes and additions—and they were to be laid down at the rate of three in each year—two battleships and an armoured cruiser. Concurrently, small cruisers, divisions of destroyers, gun-boats and special service vessels were to be built, and an increase of 35,551 officers and men was required by 1920, when it was expected the new vessels in completion of the programme would be ready—being a yearly average addition of 1776.* And along with this increase, the development of dockyard and harbour accommodation was provided for.

The general hostility of feeling expressed in Germany towards England at the time of the South African war provided the fulcrum for the lever applied by the Government in the matter of the ship-building programme, and the German Navy League entered upon its great propaganda. A speech said to have been made by the German Emperor at Hamburg at the beginning of the war was much quoted. "If naval reinforcements had not been refused me during the first eight years of my reign—refused in spite of my urgent requests and entreaties, refused with scorn and even mockery—how differently

England
and
Germany.

* Additions have since been made to the figures for the *personnel* with a total increase of 36,056.

affairs would have stood to-day ! We should be able to guard our thriving trade and commerce oversea. If you had given me the ships I wanted, we could have had South Africa as a German market."

When the Navy Estimates were discussed in the Reichstag in February, 1902, an attack was made upon Admiral von Tirpitz, Secretary for the Navy, on the ground that the intentions of the Government had been concealed, but he was supported by every party in the House, and the vessels for foreign service, which had been struck out of the votes for the programme of 1900, were restored, the very remarkable unanimity displayed by the Reichstag showing clearly that the recent outburst of Chauvinistic feeling had done much to remove all opposition to the increase of the Navy. Thus the complete establishment provided for by the Law (including four battleships and seven cruisers as a reserve) was 38 battleships, 14 large armoured cruisers, and 38 small cruisers, but by an amending act the number of armoured cruisers (comprising those for foreign service and as a reserve) was raised to 20. This amending act was known as the *Novelle* of 1906 to the Navy Law of 1900. Provision was thereby also made for increasing the destroyer divisions (144 boats instead of 96), the construction of submarines, and the larger sum demanded by the increased size and armament of ships.

A still more important alteration was made by the further amendment of 1908, which reduced the life (*Lebensdauer*) of battleships from 25 years to 20 years, and made it necessary to increase the number of battleships to be built between 1908 and 1917—18 instead of 14. In supporting this change, which in practice meant an addition to the programme, Admiral von Tirpitz insisted that the naval policy of Germany had been forced upon her by her rivals, and again he asserted the object which Germans have constantly in view—to obtain the objects of war without fighting for them. "Other Powers must realise that it is more advantageous to them to come to terms with Germany than to make war upon her."

The consistency and logical character of this expansion cannot but arouse our admiration. The programme of 1898 having been approved, political circumstances were employed to fan public opinion, and to make the scheme of 1900 acceptable. This being well in hand, the amendments of 1906 were pressed upon the Reichstag, and those having been adopted, the important change of 1908 was introduced and enthusiastically sanctioned by a large majority in the Reichstag. Any delay that may have arisen through uncertainty when the plans of the Dreadnought were unknown has

been made up, and the development of the fleet is in progress in accordance with the programme, but accelerated in anticipation of financial provisions, the ships being larger and more powerfully armed, and demanding larger expenditure than was originally contemplated. Meanwhile, the increase of the *personnel* corresponds with the growing needs of the Fleet.

The expansion of the German Navy has been accompanied by a corresponding development of the shipbuilding, armour-plate and gun-making, and harbour and docking facilities of the country. The Imperial Yard at Kiel has two building slips over 426 ft. long, a patent slip for torpedo-boats, four floating docks and six dry docks, of which two are 593 ft. long. A floating dock capable of taking ships of the largest dimensions is being constructed for the port at a cost of £375,000, as well as a smaller one for destroyers. Danzig has one building slip, three horizontal slips for destroyers, which are being lengthened, and two small floating docks. It is claimed that Wilhelmshaven is becoming the second largest naval port in the world, and the great works which have been in hand there for years are expected to be completed in 1909. There are two large dry docks, 405 ft. long, and two others are being completed, which, as well as the locks, will accommodate the largest vessels of the Dreadnought type. The northern entrance to the harbour has been reconstructed altogether, with double locks, which are 820 ft. long. Moles and other works are approaching completion, and the southern entrance has been improved in relation to the basin of the Ems and Jade canal. The harbour has been dredged, and a considerable area of land recovered for the proposed extension of the dockyard establishments. All the Government yards are fully supplied with steam, hydraulic, pneumatic, and electric power, and their shops and works are fitted with the latest and most efficient machinery.

Increase
of ship-
building
resources.

The private establishments have more than kept pace with those of Government. The Germania Yard at Kiel, which has built the battleship Schleswig-Holstein, and is now completing the Posen, has four covered slips for the construction of the largest vessels, and most extensive factories and shops in connection with the enormous gun and armour-plate factories at Essen and elsewhere. The well-equipped yard of the "Vulkan" company at Stettin is capable of shipbuilding work on the largest scale—the Rheinland was launched there—and its new establishment at Hamburg will increase its capacity for work by 50 or 75 per cent. For the latter yard, a floating dock for the largest ships has been completed. The "Weser" yard at Bremen has recently been greatly enlarged, and has at least four large building slips and a floating dock, with a lifting power of 10,500 tons.

Private
yards.

It has launched the Westfalen, and has the Ersatz Beowulf on the stocks. Messrs. Blohm & Voss at Hamburg are constructing heavy armoured vessels, and have three floating docks, with lifting capacities severally of 17,000, 17,500 and 35,000 tons. They have built the Scharnhorst, and have two cruiser-battleships in hand. The Howaldt establishment at Kiel is now equipped for building the largest vessels, and the Ersatz Siegfried has been laid down there. The Schichau firm, which has for years been building torpedo craft at Elbing, has latterly enlarged its establishment at Danzig, and has built there a number of vessels for the German Navy, the Schlesien having been completed recently.

Building
period for
"capital
ships."

All these establishments have declared their ability to build "capital ships" within periods of from twenty-four to thirty months, or, in one case, thirty-six months. The Germania Yard can lay down at least two of these yearly, and the Howaldt Yard one. The Vulkan Yard has slips and requirements for beginning four large ships yearly, and the Weser establishment the same number. Messrs. Blohm & Voss can lay down two ships of the class yearly, and the Schichau establishment has accommodation for the building on the slips of four big ships at the same time, and the completion of two or three. That work may go on with this rapidity it is, of course, essential that guns and armour-plating should be ready, and for this purpose it is credibly rumoured that the Krupp firm is in relations with other firms in Germany and elsewhere on the Continent.

Con-
clusion.

The first part of this chapter was devoted to an exposition of the fundamental causes which lie at the root of German Naval policy, and to the inevitable nature of the growth of the German Fleet. It has concluded with a sketch of the policy translated into action, and of the material resources by which that action is made possible. The subject might have been pursued further in an account of the influence of the German Navy League and of the various patriotic associations in the creation and direction of public opinion. The material side of the question might have been extended to an investigation of the numerous subsidiary establishments, which, by their efficiency, contribute to the rapidity and excellence of German warship building. But enough has been said to show the steady, thorough, and increasingly rapid development of the German Navy. Close, meditative, laborious, indefatigable was the process of inception, expansive the spring of inevitable development, and remarkable in the highest degree is the success with which the work has been put into execution. The policy of Germany was declared long ago by Frederick William I.: "Wenn man in der Welt etwas will decidiren, will es die Feder nicht machen, wenn sie nicht von der force des

Schwertes soutenirt wird." This pregnant phrase was repeated by the present German Emperor at the Zeughaus in Berlin on New Year's Day, 1900. The force behind the diplomatic pen of Germany, deciding her place in the world, is the strong Fleet which she is bending all her efforts to create and maintain.

JOHN LEYLAND.

CHAPTER VIII.

NAVAL MANŒUVRES.

THE BRITISH NORTH SEA OPERATIONS.

Character
of oper-
ations.

THE British manœuvres of 1908 in the North Sea brought together in those waters a larger number of warships than the Navy had any previous record of. The Channel and Atlantic Fleets, as well as the three divisions of the Home Fleet, were engaged, making the total number of vessels that participated 270, in addition to the flotilla of more than forty destroyers and submarines, which cruised along the coasts independently. The details of the scheme of operations were not made public, correspondents and guests were not allowed to accompany the fleets, and no report upon the operations was presented. Therefore no attempt will be made to give here more than a general statement of what occurred.

Mobili-
sation.

The mobilisation of the Home Fleet was not conducted as a surprise operation, but the arrangements worked admirably; and perhaps the greatest lessons of the success were the sufficiency of the manning resources of the Navy, the Reserves not having been touched, and the merits of the system which enabled the mobilised vessels to proceed to sea and go through the manœuvres without any material breakdown to interfere with the operations of the fleets, this situation of affairs presenting a marked contrast to that which gave so much trouble until a few years ago. In this respect the mobilisation of 1908 was an achievement almost unparalleled in the history of the Navy, and a practical demonstration of the advantages of the system.

Con-
ditions.

The war organisation of the Fleet was under trial. The scheme of the manœuvres was one of war strategy, and not a mere opposing of "A" to "B" and "C," and the fleets manœuvred in those waters in which political conditions bid us look for an eventual conflict. The fleets were to be tested under conditions of high speed, and battleships, cruisers and destroyers were to be used in their true functions, with no conventional restrictions. Such, however, was the strategical development of the operations that the fleets were not brought into

tactical contact at all, and no matters of tactical interest, apart from the handling of cruisers and destroyers in scouting and patrolling, arose in the strategical period. Tactics in the manœuvres of these days present a marked contrast to those of the times when ships were valued by points or ratios of value, and engagements were decided by the number of vessels present. In these, as in other matters, the Navy has recently shown itself a most progressive service, and it must be remembered that in the manœuvres of 1908 the strategical scheme was preceded by a fortnight of tactical work.

The three divisions of the Home Fleet assembled off Deal, under the command of Vice-Admiral Sir Francis Bridgeman, on Thursday, July 2nd, and anchored in the Downs in a line extending a distance of two or three miles. The Fleet cruised and was employed in tactical operations until the middle of the month. At the same time the Channel Fleet, under command of Vice-Admiral Lord Charles Beresford, with the First Cruiser Squadron, after the Norwegian visit, carried out combined exercises with part of the Atlantic Fleet, and the Second Cruiser Squadron.

The strategical phase of the manœuvres began on July 16th, hostilities being opened at 8 a.m. Meanwhile the Blue Fleet, under command of Lord Charles Beresford, had left Aalbeck Bay, Denmark, where it had coaled, on July 14th. The object was to prevent the junction of the two portions of the Red, or Home, Fleet, there being two straits or entrances by which the reinforcement might enter the manœuvring area. The Red Fleet, with its principal base in the Firth of Forth, patrolled the North Sea during the day, returning to the base at night, when the destroyers took up the patrol duties outside. Meanwhile the Blue Fleet patrolled around the Faroe Islands, between the Orkneys and Shetlands, and down to Wick, covering one of the approaches screened by its cruisers, while the Duke of Edinburgh, which carried a powerful wireless installation, and other cruisers, as well as the 27-knot destroyers, were watching the other approaches on the south. Such were the conditions. In the event, the vigilance of the Blue Fleet was eluded, its communications having apparently been interrupted on two occasions, and the Red reinforcement was unimpeded in its movement to join the Red Commander-in-Chief.

Movements.

The manœuvres were, therefore, entirely uneventful, and from the tactical point of view disappointing. In peace manœuvres the long and slow development of operations, which may be necessary during the assembly of forces to secure command of the sea, cannot be reproduced, and it is usually the object of admirals, not to assume a merely watchful attitude, but to compel strategic develop-

Conclusion.

ments conducing to tactical consequences. The precise orders which the rival admirals received were not made public, but we must believe that an effort was made in the North Sea manœuvres to lead to decisive results. If so, it was unsuccessful, and both sides claimed the victory. Sir Francis Bridgeman had succeeded in uniting his divided forces undeterred, which was the primary object to be attained. On the other hand, Lord Charles Beresford claimed that he had enjoyed complete freedom of action for sixty-two hours, and that he had watched the openings into the manœuvre area. He, therefore, on July 20th, returned to his base, and telegraphed to the Admiralty saying the strategical manœuvres were over, and asking that the Blue and Red Fleets should meet to carry out tactical exercises. The operations had come to an end some hours before the time allotted for their close, and the Admiralty refused to accede to his request. The Board appeared to be dissatisfied with the indecisive results of the movements, in which no strategic compulsion had led to tactical results. Neither fleet had sighted the other from beginning to end of the operations.

Signal
incident.

The preliminary period of the manœuvres was marked by an incident which may be mentioned here. It was said that Rear-Admiral Sir Percy Scott, whose flag was in the *Good Hope*, had refused to perform a certain evolution, on the ground that it presented dangers analogous to those which led to disastrous consequences in the case of the *Victoria* and *Camperdown*. In the House of Commons, Mr. McKenna explained the views of the Admiralty on this incident. "The Board of Admiralty," he said, "have examined the positions of the fleet at the time the signal was made, and they are satisfied that the manœuvre was not dangerous. At the same time, the Rear-Admiral, as he thought there was a risk in carrying out the order, was justified in turning the other way. The Commander-in-Chief so informed him by signal at the time."

THE ITALIAN COMBINED MANŒUVRES.

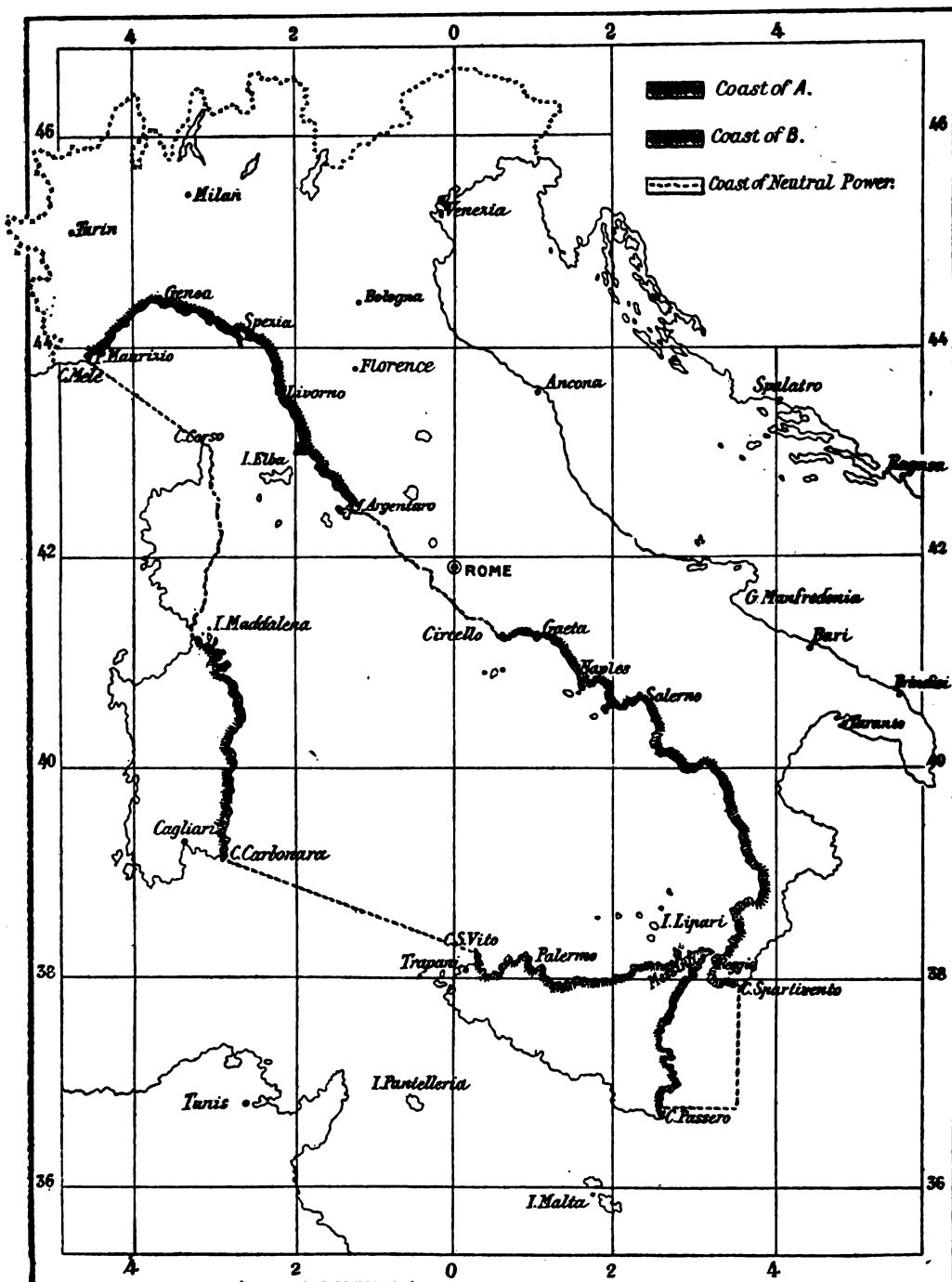
Scheme of
opera-
tions.

The Italian naval manœuvres of recent years have presented a degree of interest and importance out of proportion to the strength of the forces actually engaged, numerous and well-handled as these have often been. In 1904 and 1905 certain special minor exercises were the chief study during the operations; in 1906 there was a strategical scheme, with the improvisation of a naval base; in 1907, the Fleet was occupied in a continuation or development of operations of the same class; and in 1908, the manœuvres, which were on a

large scale, were devoted to the elucidation of the most important of all the problems of Naval warfare, viz., the contest for the command of the sea, and the subsequent embarkation and disembarkation of an expeditionary force. That the operations possessed any final value in this connection cannot be said. A necessary limitation of initiative was implied by the weakness of the inferior belligerent, but the elements for the solution of the problem were at work, the manifold difficulties were brought home to those employed, and the conditions of the problem of the oversea transport of troops as an operation of war were placed in a very practical light, though with a comparatively small force. The result was pre-arranged; the forces were so disposed that the weaker belligerent was unable seriously to dispute the command of the sea; and the stronger adversary had no difficulty in embarking his forces and in landing them at the place desired, so that subsequent land operations might ensue according to the plan. In order that this might be brought about, the rules provided that tactical considerations were to be subject to strategic dispositions. Admiral the Duke of Savoy, who, with Vice-Admiral Bettòlo, was in the Lepanto, in an order of the day issued to the naval forces, said that the manœuvres were based on the multiform features of maritime warfare in their influence on land operations, and that the exercises would have a beneficial effect in bringing the sister services into closer and better relationship.

The scene of operations was the Tyrrhenian Sea, bounded on the north and north-east by the coasts of the mainland, and on the west by a line drawn from Cape Mele to Cape Corso, then by the eastern coasts of Corsica and Sardinia, thence by a line drawn from Cape Carbonera to Cape San Vito in Sicily, and thence again by the northern and eastern coasts of the island, as far as Cape Passero. A line drawn eastward from that place to touch the longitude of Capo d'Armi, and thence northward to the mainland, included a small area of the Mediterranean outside the Strait of Messina. Parts of the enclosing line represented the coasts of a neutral state, and "A," which was the stronger Power, had his territory defined by the eastern coast of Sardinia, the northern and eastern coasts of Sicily, and the western coasts of Italy as far north as Monte Circello. "A" also possessed the islands south of the last-named place. The territory of the weaker "B" force began at Porto Ercole, and included the coast line round the Gulf of Genoa as far as Cape Mele. The object of "A" was to attain complete command of the sea (*assoluta padronanza del mare*), to destroy the coast railways and roads of "B," so as to retard his mobilisation, and then to disembark an expeditionary force to defeat his land army. "B's" object was to

Area of
manœu-
vres and
forces
engaged.



prevent, if possible, or otherwise to retard, the success of these operations. The forces engaged were as follows:—

“ A ”

NAVAL FORCES.

ARMoured SHIPS . .	Regina Margherita (flag of Vice-Admiral Grenet), Benedetto Brin, Emanuele Filiberto, Saint-Bon, Re Umberto (flag of Rear-Admiral Rocca Rey), Sardegna, Sicilia; Vettor Pisani (armoured cruiser).
TORPEDO GUNBOATS . .	Agordat, Urania, Iride, Partenope (mining).
DESTROYERS . . .	Ostro, Freccia, Strale, Euro, Aquilone, Espero, Bersagliere, Artigliere.
FLEET AUXILIARIES .	Liguria (balloon ship), Bronte, Sterope, Vespucci, Flavio Gioia, Garigliano, Volcano, (constituting the convoy for the transports conveying war material for the temporary base).
Hired TRANSPORTS .	Lombardia, Sicilia, Sannio, Catania (for the embarkation of the Expeditionary Force).

LAND FORCES

(representing an invading force).

Lieutenant-General Luigi Zucchi in command; a division of infantry and a mixed brigade comprising staff, three brigades of infantry, one regiment of Bersaglieri, two squadrons of cavalry, five field batteries and three heavy batteries with ammunition columns, two companies of engineers, two wireless telegraphy sections, medical and auxiliary services.

FORTRESSES AND NAVAL BASES.

Maddalena, Messina, and Gaeta.

“ B.”

NAVAL FORCES.

ARMoured SHIPS . .	Garibaldi (flag of Rear-Admiral Gagliardi), Varese, Ferruccio, Regina Elena.
TORPEDO GUNBOATS, &c.	Piemonte, Coatit, Tripoli (mining), Lombardia (torpedo depot ship).
DESTROYERS . . .	Airone, Albatros, Astore, Arpia, Cassiopea, Calliope, Canopo, Cigno, Clio, Pallade, Perseo, Pegaso, Spica, Saffo, Sagittario, Scorpione, Gabbiano, Pellicano, Nibbio, Falco.
SUBMARINES . . .	Glauco, Squalo, Narvalo, Otaria.

MOBILISED LAND FORCES.

Lieutenant-General Camillo Crema in command: three brigades and a battalion of infantry, two battalions of Bersaglieri, one squadron of cavalry, five field batteries, a brigade command and three companies of fortress artillery, engineers, telegraphists, and auxiliary services.

FORTRESSES AND NAVAL BASES.

Vado, Spezia, Genoa, and Monte Argentario.

At the opening of the hostilities, at 4 a.m. on August 7th, the “B” Squadron was at sea in a position unknown to its adversaries, while “A” had the Regina Margherita, Brin, Filiberto, Saint-Bon, Vettor Pisani, Agordat, and Urania at Augusta; the Re Umberto,

Relative
advan-
tages of
“A.”

Sicilia, Sardegna, Iride, Partenope, and Liguria, with a flotilla of destroyers and all the auxiliaries at Maddalena; and a destroyer flotilla at Gaeta. The inferiority of "B" to "A" was in the proportion of 1 to 1·9, and to the squadron of "A's" ships at Augusta of 1 to 1·3, while "B" was superior in the proportion of 1 to 0·6 to the "A" Squadron at Maddalena, which was under the command of Rear-Admiral Rocca Rey. Admiral Gagliardi, "B," had, therefore, but one really effective possibility before him, viz., to attack the "A" ships at Maddalena, if they could be brought to action, before Admiral Grenet could unite his forces; but Maddalena being a fortified base, his success was dependent on his adversary offering himself to disadvantageous attack. There appeared to be some likelihood that Admiral Gagliardi, being in a position to do much damage to "A's" signal stations and the railways on his coast line, might cause Admiral Rocca Rey to leave his port, and there was always the possibility that with his large flotilla of destroyers and submarines he might be able to inflict serious loss on his more powerful adversary, and so influence the result.

Move-
ments.

The "B" Fleet, in full strength, left Vado at 3 p.m. on August 16th, proceeding at its highest available speed of 14 knots—two-thirds of the boilers under steam at natural draught, according to the rules—but much wind and a heavy sea caused the Admiral to reduce for some hours to 10 knots, so that at the opening of hostilities he was still about forty miles north of Maddalena, which it was his object to examine and perhaps to attack. Admiral Gagliardi was thus placed at a disadvantage at the very beginning. His more powerful adversary's plan of operation was to unite his forces in the neighbourhood of Maddalena on the third day of hostilities, and with this object to move from Augusta, pass the Strait of Messina, pick up the destroyers from Gaeta, and then proceed south to get between his adversary and Naples. From Naples he proposed to steam to Maddalena, keeping touch with his signal stations, and, having joined his Rear-Admiral, who had instructions not to leave that port, to proceed northward and force his adversary to action, or drive him into Spezia. He took little account of any damage which Admiral Gagliardi might attempt on the coast, except at Naples, knowing that it could not affect the result, save, perhaps, by placing the "B" Fleet in a position of danger. His first object was so far to gain such mastery that his transports, conveying war material and necessities, might cross from Maddalena to Elba, where a temporary base for the subsequent invasion operations was to be established at Portoferraio. Admiral Gagliardi's plan, after reconnoitring Maddalena, was to leave his destroyers with Aranci Bay as their base, and the Piemonte

as their depôt, and then to proceed to Naples with the object of bombarding the arsenal, if possible, after which he would return to Maddalena.

On August 17th, Admiral Gagliardi kept on his route from Vado to Maddalena, sending the Piemonte and the destroyers to Aranci, and instructing the Ferruccio to destroy the signal station at Cape Figari, while he opened fire on the harbour works and basins at Maddalena. In the course of this operation the "B" Admiral transgressed a cardinal rule of naval warfare, and suffered for so doing, by opposing his ships to forts, and came several times under the fire of the shore guns, while doing no damage to Admiral Rocca Rey's squadron, which was lying there in safety. At 5 p.m., leaving his destroyers to effect what damage they could, he departed with the Garibaldi, Regina Elena, Ferruccio, and Varese to make his contemplated attack on Naples. Meanwhile, Admiral Grenet, "A," had left Augusta, steaming at 11 knots, and at 8 a.m. had passed the Strait of Messina. At 2 p.m., in the vicinity of Stromboli, he had joined his destroyers from Gaeta, and at dawn on the 18th hoped to be abreast of Capri. Admiral Gagliardi succeeded in bombarding the signal stations of Ponza, Ventotene, and Punta Imperatore, but at 8.40 a.m., on August 18th, the opposing fleets were in view of one another at a distance of ten miles, and the "B" admiral, in the presence of his superior adversary, had no choice but to abandon his enterprise, and escape to the north-west, which he did, throwing the torpedo-gunboats, which were pursuing him, off the scent in the night.

Ships
opposed to
forts.
Subse-
quent
move-
ments of
"B."

On the morning of the 19th, Admiral Gagliardi was in the vicinity of Elba, with the Piemonte and Coatit scouting to the south, but he had been unable to prevent his adversary from concentrating his forces at Maddalena, and was hopelessly outmatched. Moreover, the "A" destroyers had been cutting cables and breaking bridges on the coast. Admiral Grenet had joined Rear-Admiral Rocca Rey at 10 a.m., and the same afternoon the whole fleet proceeded in the direction of Giglio, the big ships in single line, and the smaller vessels on a broad front scouting ahead. The Agordat was successfully torpedoed by a "B" destroyer in the night, but the position of Admiral Gagliardi was hopeless, and he made also the mistake of allowing himself to be surprised in the Strait of Piombino. An attempt was made to cut off his retreat, but he escaped, and at 2 p.m. on the 20th reached Spezia. Admiral Grenet had demonstrated once more the truth of the saying of Sir Cloudesley Shovell, "Tis, without a miracle, number that gives the victory." His adversary, hopelessly inferior, had also suffered such damage from the shore guns at Maddalena that the co-efficient of his whole fleet

Concen-
tration
of "A."

was unequal to that of three ships of "A" which pursued him, while the rest of Admiral Grenet's fleet was coming up from the south. The Sardegna shelled the Naval Academy at Leghorn, and other vessels were employed on the coast, breaking the railway communications and destroying signal stations.

The temporary base at Portoferraio.

Meanwhile, Rear-Admiral Rocca Rey had returned to Maddalena with the Umberto, Vettor Pisani, Saint-Bon, Liguria, and a flotilla of destroyers, in order to escort the transports conveying materials intended for the temporary base from that place to Portoferraio, Elba. The island had been isolated by the destruction of the signal stations and cables. The preparations of the new base began on the evening of the 21st, and were continued with the utmost rapidity, the men from the ships working with great activity and energy. While this was in progress, the "A" Squadron established a blockade of Genoa and the Ligurian coast, on a line from Sestri Levante to Cape Noli, the ships patrolling on appointed courses at intervals of five miles. By this time, August 25th, the co-efficient value of "B" had been reduced to one as compared with fifteen of "A," so that the latter was overwhelmingly superior.

"A's" faulty system of blockade.

Admiral Grenet, however, had undertaken the perilous work of attempting a blockade in the vicinity of his enemy's torpedo flotillas, with consequences that should have been foreseen. The submarines were at first unsuccessful, but the Sicilia, Filiberto, and Umberto were torpedoed in succession by the destroyers, and the Vettor Pisani by the submarine Glauco, and all four vessels were ordered to proceed to Portoferraio, whereby the value of "A" was greatly reduced. The Saint-Bon and certain of the smaller vessels continued the blockade, while "B" was able to send his destroyers to menace the temporary base at Portoferraio, where five "B" boats were put out of action. Hostilities were suspended at 8 a.m. on August 28th.

Embarkation of expeditionary force.

Meantime, active preparations had been made at Leghorn and Genoa for the embarkation of the expeditionary force of "A" in the hired transports, and at 10 p.m. on the 29th hostilities were to be resumed. The Sicilia, Lombardia, and Sannio, of the Compagnia Generale Italiana, left Genoa on the morning of August 27th for Leghorn, where the Sicilia took on board a brigade command and the 10th infantry regiment, 1150 strong, besides a great deal of forage; the Lombardia 1300 men of the 9th regiment and some bridging material; and the Sannio a company of sappers, a brigade and two mountain batteries, a squadron of the Lucca cavalry, a heavy battery, wireless telegraphists, medical service and auxiliaries, having a total strength of 981. The Sannio was also fitted with stalls for 330 troop horses and 38 for officers' horses. The Catania embarked at Genoa

troops to the number of 424, including 26 officers, a company of fortress artillery with a battery of 6-in. howitzers—which were hoisted on board within an hour—an ammunition column, searchlight, and ballooning details, equipment, etc. The embarkation of the troops and material at Leghorn and Genoa occupied the whole of the day on the 28th, and the transports left their ports for Portoferraio.

The destroyers of "B" were active, but, notwithstanding, at 2 p.m. on the 30th the transports, convoyed by the whole fleet, departed from Portoferraio to move along the Ligurian coast to the place selected for disembarkation. There were some torpedo attacks, but no damage was effected. The four transports took station under way at the angles of a square of 1200 mètres, within which the transports of a complete expeditionary force were supposed to be under convoy, while the troops they would have carried were in reality assembled on the coast between Pietra and Albenga. In the order of steaming the transports were led by a warship, and warships were on their flanks and rear, and a course was shaped for the vicinity of Cape Noli, where an anchorage was selected. The operation of disembarkation began at 5.30 a.m. on August 31st, and, though the weather was unfavourable, the troops were on shore by 9.30 a.m., after which the landing of the heavy material began, and was completed in the afternoon. The "B" Squadron attempted to interfere with the operations, but was driven off.

Transport
and disembarkation
of troops.

It is not necessary to say anything of the military operations which ensued, under the direction of Lieutenant-General Viganò, nor to describe the review of the Fleet by the King, which took place on September 6th. The result of the operations had been foreseen and pre-arranged. The command of the sea passed absolutely into the hands of the superior fleet of Admiral Grenet, or must be supposed to have done so. Perhaps it was not desired to put an end to the exercises of the fleet under command of Admiral Gagliardi; be this as it may, his vessels were given a new lease of life, and were allowed to appear on the scene during the transport and disembarkation of the fleet. This may be regarded as a convention of the manœuvres, and not as actually representing the conditions of war, in which a fleet of transports will never, we think, be found moving at night in the presence of a flotilla of the enemy's destroyers. Moreover, as the *Perseveranza* remarked, the problem of landing an invasionary corps was not solved by disembarking a brigade in such conditions as existed. A superior naval force had been designed to give complete security, and yet some of the enemy's torpedo craft, under manœuvre rules, were still active and menacing.

Subsequently to the manœuvres, Admiral Bettòlo, chief of the

Criti-
cisms.

naval staff, passed at Spezia some criticisms on the operations, which were significant. He said that Admiral Gagliardi should not have subjected his small squadron to the fire of the forts of Maddalena, and that his better policy would have been to endeavour to do as much damage as possible to his adversary by night attacks. When the junction of the "A" force had been effected, he should not have allowed himself to be surprised by superior forces in the Strait of Piombino. These were serious errors, but otherwise he had handled his squadron with a good deal of skill. Admiral Grenet's conception of his plan of operations was safe and judicious, but Admiral Bettòlo had severe censure for the manner in which he conducted the blockade of Genoa. He compared this operation with the blockade of Port Arthur by Admiral Togo, who, however, had his station 50 miles distant from the place blockaded, and maintained his watch at night with his destroyers and linking vessels. These remarks of Admiral Bettòlo were followed by others at a naval conference, concerning which nothing has been published. But, *si vera sunt exposita*, there were other conclusions to be drawn, and amongst them that, though command of the sea may have been gained, there are still perils from mines, submarines, and other agencies, which will make even a powerful enemy pause before he enters upon the hazardous business of sending afloat a great expeditionary force to land on an enemy's shore.

For the information contained in this account of the Italian combined manœuvres, acknowledgment must be made to valuable articles in the *Rivista Marittima*, the *Popolo Romano*, the *Perscrvanza*, and other Italian sources.

GERMAN OPERATIONS.

The German naval manœuvres were not of great importance, and little has been published regarding them, but there is reason to know that those whose business it is to be acquainted with strategical and tactical progress are sufficiently informed on the subject. The High Sea Fleet, with the exception of the Stettin, Blitz, and Pfeil, passed through the Kaiser Wilhelm Canal in the middle of July, and made an Atlantic cruise for the training of officers and men, the ships visiting Madeira, the Canary Islands and the Azores, and returning to Kiel on August 13th. On August 27th, the Fleet, having coaled and taken in supplies, left Kiel for the manœuvres, with its four destroyer flotillas, and cruised for ten days in the Baltic, employed in tactical and other exercises, in the course of which it visited Heiligendamm, Misdroy, Rügen, and Swinemünde. It returned to

Kiel on September 6th. There it coaled as an evolution, and the best hourly results are said to have been 383 tons for the Kaiser Wilhelm der Grosse, 332 tons for the Wittelsbach, 328 tons for the Elsass, 435 tons for the Yorck, and 258 tons for the Hamburg. The fleet then passed through the Kaiser Wilhelm Canal at the highest speed attainable, making what the Germans call a *Kriegsmarsch*, and the manœuvres concluded in the North Sea on September 12th and 13th. They were based upon schemes for the attack and defence of Wilhelmshaven and the mouth of the Elbe. There have subsequently been destroyer exercises concerned with the defence of the Belts between the Baltic and the Cattegat, against an enemy attempting to enter the Baltic, which have caused a good deal of apprehension in Denmark.

THE JAPANESE MANŒUVRES.

There were very important manœuvres in October and November, 1908, in which the following vessels took part:—

BATTLESHIPS (10): Katori, Kashima, Asahi, Shikishima, Iwami, Fuji, Mikasa, Hizen Sagami, Suo.

FIRST CLASS CRUISERS (11): Tsukuba, Ikoma, Asama, Tokiwa, Iwate, Idzumo, Yakumo, Adzuma, Kasuga, Nisshin, Aso.

COAST DEFENCE VESSELS (4): Iki, Chinyen, Okinoshima, Mishima.

SECOND CLASS CRUISERS (7): Soya, Kasagi, Chitose, Naniwa, Takachiho, Itsukushima, Hashidate.

THIRD CLASS CRUISERS AND DESPATCH BOATS (14): Akitsusu, Chiyoda, Akashi, Suma, Otowa, Niitaka, Tsushima, Izumi, Mogami, Tatsuta, Yodo, Chihaya, Yaveyama, Sutsuya.

SPECIAL SERVICE BOATS (3): Anekawa, Mansyu, Kwantomaru.

TORPEDO DESTROYERS AND TORPEDO BOATS, 65.

The total number of vessels employed was 114 of all classes. The manœuvres were under the command and direction of Admiral Count Heiachiro Togo, Chief of the Naval Staff, and were carried out in two periods, the first beginning in the middle of October and continuing until the end of that month, and the second period starting at the commencement of November, and continuing until the 10th of the same month. The whole of the Fleet and other vessels which were to take part were those actually in commission, and were organised in squadrons for the manœuvres and concentrated at their stations preparatory to the first period. The principal object to be attained was to ensure that officers should have thorough experience of all technical matters, and tactical operations. The organisation was in three squadrons, which proceeded respectively to Kure, Sasebo, and Basauko. During the second period the operations were of a strategical character, the battleships and other vessels being divided into two fleets, one under command of Vice-Admiral Goro Ijuin, and the other of Vice-Admiral Juen Dewa, operating against one another in the vicinity of Kyushu and the Strait of Korea.

At the conclusion of the second period of the manœuvres, the whole Fleet was assembled at Kobe for a great naval review, on November 18th, the torpedo depôt ships Toyohashi and Karasaki, as well as seven submarine vessels, being present, in addition to those which had been engaged in the operations. The total number of Japanese vessels at the review was 123, including one taken from the Chinese in the war of 1894-5, and 14 from the Russians in the late war. The vessels were lying in six lines, and the Emperor, embarking in the Asama, and escorted by the Uranami, Manshiu, and Yodo, passed along the lines, all the vessels being dressed rainbow fashion. The submarines executed a manœuvre, submerging and rising very successfully. The visitors on board the Asama included Prince Fushimi, Marshals Yamagata and Oyama, Generals Oki, Kuroki, and Nogi, and Admirals Togo, Uryu and Kamimura.

It has been thought desirable to give in this place an account of the principal manœuvres of the year, more as a record than as a study of strategy. Indeed, except in the case of Italy, the materials for such a study do not exist. The French had no grand manœuvres at all, the long series being interrupted, it is said, and not concluded. The particulars of manœuvres given in this chapter must be taken in the light of their inevitable limitations.

JOHN LEYLAND.

POSTSCRIPT.

IN closing the present issue of the *Naval Annual* with a postscript, the opportunity is afforded for brief observations on subjects of pressing interest.

All in positions of responsibility in relation to Naval administration are agreed as to the necessity of maintaining the strength of the British Navy at a standard of equality to any two Powers which we must be prepared to meet. The latest interpretation of the two-Power standard is widely different from that which would have been given at the date when it was first accepted as a rough guide. A quarter of a century ago, France, the only other country which possessed a powerful Navy, was running Great Britain a close race. A combination with any European Naval Power would have been formidable. In view of the situation as it then existed, the three distinguished Admirals to whom the examination of our requirements had been referred recommended that the British Navy in time of peace should be maintained at a strength equal to the next two strongest Naval Powers combined. The Naval Defence Act of 1889 was framed on the basis of this recommendation. It was designed to secure superiority for the British Navy as against a combination of European Powers.

The two-Power standard.

The demand is now being made that regard should be had to the naval preparations of the United States. We are far removed in distance. It cannot be contended that if the United States should resolve to strengthen its naval forces in the Pacific, it would be necessary to put increased burdens on British tax-payers. We have no cause of quarrel. On both sides we may say, as it was once said by an Admiral of the United States Navy, "Blood is thicker than water"; or later, by another American Admiral, in one of many statesmanlike and soul-stirring speeches to Australasians, "We are more than cousins." At the present juncture Mr. Asquith has given an assurance of his resolve to maintain the Navy in the only form which could set at rest the public anxiety. The position must be periodically reviewed by the Government of the day.

The Editor has elsewhere fittingly called attention to the relative appropriations to construction under the Estimates of the leading Powers. In Germany approximately half the amount voted for the Navy is appropriated to construction. The corresponding sum for

Naval expenditure.

the British Navy is, in round figures, one-fourth of the total amount voted. The figures below for the year 1909-10 were given recently by Mr. McKenna in reply to a question in Parliament as to the naval expenditure of the principal foreign Powers:—

	Total Naval expenditure.	For new construction and armaments.
France	£13,353,825	£5,760,176
Russia	10,028,881	1,822,237
Germany	19,592,532	10,751,466
Italy	6,355,294	1,799,509
United States	27,876,889	10,015,101

The sum voted for the Navy by the British Parliament last year was £32,319,500, of which £7,545,202 was for new construction and £2,048,700 for armaments.

In December last Mr. McKenna gave the total sums provided for the material upkeep of fleets by Germany, the United States, and the United Kingdom.

	Amount.	Year.
Germany	£11,942,009	1909-10
United States	9,358,108	1908-9
United Kingdom	11,221,534	1908-9

The cost of the German Fleet in commission is small in comparison with the expenditure for which provision is made in the British Estimates.

As the Editor of the *Naval Annual* points out, the policy of keeping the Fleet in a state of immediate preparedness for war entails a heavy burden on our annual votes. The undoubted advantage which we gain from the policy pursued by the Admiralty for some years past is an element not to be put out of view when we compare our strength with the two-Power standard.

The manning policy of the Admiralty entails a heavy charge. At no former period in our history, nor in any other country, has it been attempted to provide for the manning of the fleet with permanent men in the proportion now established for the British Navy. The numbers are:—Great Britain, 128,000; Germany, 53,981; United States, 60,703. The cost of manning for the British Navy, as compared with the German figures, affords a striking example of the difference in cost between voluntary and compulsory service.

	1908.	
	<i>Great Britain.</i>	<i>Germany.</i>
Wages	£7,129,700	£1,533,196
Half Pay	868,800	
Pensions	1,334,600	
	<hr/> £9,333,100	

In the last ten years our permanent Naval forces have been increased from 108,595 to 128,000 men. The charge for wages has advanced from £5,208,161 to £7,129,700.

In comparison with the naval forces of foreign Powers, the British Navy is manned in an excessive proportion with permanent men. It should be the aim of the Admiralty to strengthen the Reserves in numbers and efficiency.

The present writer cannot lay down the pen without a tribute to Lord Charles Beresford. When he hauled down his flag, it was a day of lamentation in the Naval Service and throughout the length and breadth of the Empire. Lord Charles Beresford has had a long and brilliant career, marked from its commencement by deeds of bravery. In the highest commands, for many years past, he has shown consummate skill in the art of handling ships. He knows his many-sided and difficult profession in its leading principles and its infinite details. He possesses those qualities by which a leader gains the personal devotion and confidence of those serving under his command.

Lord
Charles
Beresford.

BRASSEY.

PART II.

**LIST OF BRITISH AND FOREIGN SHIPS.
ORDNANCE TABLES.**

PART II.

LIST OF BRITISH AND FOREIGN SHIPS.

THE following abbreviations are used throughout the Alphabetical List:—

a.c. Armoured cruiser.	h.s. Harveyised or similar hard-faced steel.
a.g.b. Armoured gunboat.	k.s. Krupp steel.
b. Barbette ship.	shd. Sheathed.
c.b. Central-battery ship.	p. Protected.
c.d.s. Coast-defence ship.	t. Turret-ship(in class column).
comp. (in armour column). Compound or steel-faced armour.	z. Speed and I.H.P. at trials (in speed and I.H.P. columns).
cr. Cruiser.	to.cr. Torpedo-cruiser.
d.v. Despatch vessel.	to.g.b. Torpedo-gunboat.
g.b. Gunboat.	
g.v. Gun-vessel.	
l. Light guns under 15 cwt., including boats' guns.	
m. Machine guns.	
sub. Submerged torpedo tube.	
A. Armstrong guns.	K Krupp guns.

The following abbreviations are used to distinguish the various types of boilers:—

W.T. Water-tube boilers, where the type is not known.	My. Myabara.
B. Belleville.	Nic. Niclausse.
Bl. Blechynden.	Nor. Normand.
B. & W. Babcock and Wilcox.	N.S. Normand-Sigaudy.
D'A. D'Allest.	R. Reed.
D. Dürr.	T. Thornycroft.
E. Earle.	T.S. Thornycroft-Schulz.
Ex. Express.	W.F. White-Forster.
Du T. Du Temple.	Y ¹ . Yarrow small tube.
L. Laird.	Y ² . Yarrow large tube.
L.N. Laird-Normand.	V.E. Vickers Express.
M. Mumford.	cyl. Cylindrical.

GREAT BRITAIN.—Armoured Ships.

Class	NAME	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Makers of Engines.	Date of Launch.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position.	Heavy Guns.	Second-ary.	Guns.			
a.c.	Aboukir	shd. 12,000	440	63½	26½	21,375 B.	Govan	Fairfield	1900 1902	£ 751,118	in. 6-2 K.S.	in. 3-1½	in. ..	in. 5 H.N.	in. 6 K.S.	in. 6	in. 5	2 9-2-in., 12 6-in., 14 12-pr., 3 3-pr., 8 m., 2 l.	2 21-6 t	tons. 800 1600	755
a.c.	Achilles	13,550	480	73½	27	23,275 Yz & cyl.	Elswick	Hawthorn	1905 1907	1,191,103*	6-4-3 K.S.	3-1	6	6	6	6	6	6 9-2-in., 4 7-5-in., 2 12-pr., 28 3-pr., 2 m.	3 23-27 t	1000	704
b.	Africa	16,350	425	78	26½	(18,698) B. & W. & cyl.	Chatham	J. Brown	1905 1906	1,401,429*	9 H.S.	2-1	8-7	12 H.S.	12-6 H.S.	7 K.S.	7	4 12-in., 4 9-2-in., 10 6-in., 26 small.	4 18-95 t	950 2150	781
b.	Agamemnon	16,500	410	79½	27	17,285 Yz	Govan	Hawthorn Leslie	1906 1908	1,651,289*	12-6 K.C.	2	8	8	12	7	7	4 12-in., 10 9-2-in., 24 12-pr., 5 3-pr., & 5 m.	5 18-75 t	900 2500	865
b.	Albemarle	14,000	405	75½	26½	18,296 B.	Chatham	Thames Ironworks	1901 1903	1,009,885	7-3 K.S.	2-1	7	7 K.S.	11 K.S.	6 K.S.	6	4 12-in., 12 6-in., 12 12-pr., 8 3-pr., & m.	4 18-6 t	900 2000	750
b.	Albion	12,950	390	74	26	13,500 B.	Blackwall	Maudslay	1898 1902	858,745	6-2 H.N.	3-1	6	12-8 H.N.	12-6 H.N.	5 H.N.	5	4 12-in., 12 6-in., 12 12-pr., 8 3-pr., & m.	4 18-25 t	1000 2300	700
a.c.	Antrim	10,850	450	68½	25	(21,604) Y. & cyl.	Clydebank	J. Brown	1903 1905	906,335*	6-2 H.N.	2-3	..	4½ H.N.	6 H.N.	6 H.N.	6	4 7-5-in., 6 6-in., 2 12-pr., 22 3-pr., 2 m. .	2 23-02 t	800 1950	655
a.c.	Argyll					(21,190) B. & W. & cyl.	Greenock Foundry	1904 1906	906,308*	6-2 H.N.	2-3	..	4½ H.N.	6 H.N.	6 H.N.	5	2 9-2-in., 12 6-in., 14 12-pr., 3 3-pr., 8 m., 2 l.	2 21-75 t	800 1600	755	
a.s.	Bacchante	shd. 12,000	440	69½	26½	21,520 B.	Clydebank	J. Brown	1901 1902	787,280	6-2 K.S.	3-1½	..	5 H.N.	6 K.S.	6	5	2 9-2-in., 12 6-in., 14 12-pr., 3 3-pr., 8 m., 2 l.	2 21-75 t	800 1600	755
b.	Barfleur	shd. 10,500	360	70	25½	13,163	Chatham	Greenock Foundry	1892 1894	582,605	12 comp.	2½-2	4 N.S.	8 comp.	9 comp.	9	4-2 N.S.	4 10-in., 10 6-in., 2 9-pr., 8 6-pr., 9 3-pr., 7 m., .	3 18-50 t	750 1210	625

a.c.	Bedford	9800	440	66	24½	22,457 B.	Govan	Fairfield	1901	1903	706,020	4-2 K.S.	2-½	..	3 K.S.	4 K.S.	4 K.S.	14 6-in., 10 12-pr., 3 8-pr., 2 m., 2 l.	2	22-7 †	740 1760	537
b.	Bellerophon	18,600	490	82	27	23,000 B. & W.	Portsm'th	Fairfield†	1907	1909	1,765,342*	11 K.C.	..	..	..	11 K.C.	11 K.C.	10 12-in., 16 4-in.	..	20-75 to 21	900 870	870
a.c.	Berwick	9800	440	66	24½	22,000 Nic.	W. Beard- more & Co.	Humphrys	1902	1903	750,984	4-2 H.S.	2½	..	5 N.S.	5-4 N.S.	4 N.S.	14 6-in., 10 12-pr., 3 8-pr., 9 m.s.	2	23-0	800 1800	537
a.c.	Black Prince	13,550	480	73½	27	23,939 B. & W. & cyl.	Blackwall Ironworks	Thames	1904	1906	1,193,414*	6-4-3 K.S.	¾-1	6	6	6	6	6 9-2-in., 10 6-in., 2 12-pr., 28 8-pr., 2 m.	3	23-65 †	1000 2000	704
b.	Britannia	16,350	425	78	26½	18,725 B & W & cyl	Portsm'th	Humphrys	1904	1906	1,450,757*	9 H.S.	2-1	8-7	12 H.S.	12-6 H.S.	7 K.S.	12-in., 4 9-2-in., 10 6-in., 14 12-pr., 16 8-pr., m.	4	18-72 †	950 2150	781
b.	Bulwark	15,000	400	75	26½	15,000 B.	Devonp't	Hawthorn	1899	1902	997,846	9 H.S.	3-2	3	12 H.S.	12-5 H.S.	6-2 K.S.	4 12-in., 12 6-in., 18 12-pr., 8 8-pr., & m.	4	18-0	900 2000	781
b.	Cesar	14,900	390	75	27½	12,000	Portsm'th	Maudslay	1896	1897	885,212	9 H.S.	4-2½	9	14-9 H.S.	14-6 H.S.	6 H.S.	4 12-in., 12 6-in., 18 12-pr., 12 8-pr., 2 m., 2 l.	5	17-5	900 2000	757
b.	Canopus	12,960	390	74	26	13,500 B.	Portsm'th	Greenock Foundry	1897	1900	866,516	6 H.S.	3-1	6	12 H.S.	12-5 H.S.	5 H.S.	4 12-in., 12 6-in., 12 12-pr., 8 8-pr., & m.	4	18-25	800 1850	700
a.c.	Carnarvon	10,850	450	63½	25	21,489 Nic.&cyl.	Beardm're	Humphrys	1903	1905	890,840*	6-2 K.S.	2-½	..	4½ K.S.	6 N.S.	6	4 7-5-in., 6 6-in., 2 12-pr., 22 8-pr., 2 m.	2	23-3 †	800 655	655
b.	Centurion	10,500	360	70	25½	13,214	Portsm'th	Greenock Foundry	1892	1893	593,050	12 comp.	2½-2	4	12 N.S.	9 comp.	6-2 K.S.	4 10-in., 10 6-in., 8 6-pr., 12 8-pr., 7 m., 2 l.	3	18-25	750 1125	625
a.c.	Cochrane	13,550	480	73½	27	23,654 Y² & cyl.	Govan	Fairfield	1905	1906	1,193,121*	6-4-3 K.S.	¾-1	6	6	6	6	6 9-2-in., 4 7-5-in., 2 12-pr., 28 8-pr., 2 m.	3	23-29 †	1000 704	704
b.	Collingwood	19,250	500	84	27	24,500 Y²	Devonp't	Hawthorn†	1908	..	1,720,887	..	..	..	..	..	..	10 12-in., 20 4-in.	..	21	900 870	870
b.	Commonwealth	16,360	425	78	26½	18,538 B & W & cyl	Govan	Fairfield	1903	1905	1,481,811*	9 H.S.	2-1	8-7	12 H.S.	12-6 H.S.	7 K.S.	4 12-in., 4 9-2-in., 10 6-in., 14 12-pr., 16 8-pr., m.	4	19-01 †	950 2150	781

* Total estimated cost of ship including guns.

† Turbine machinery.

GREAT BRITAIN.—Armoured Ships—continued.

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Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour.					Armament.		Speed.	Coal.	Complement.	
												Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	2 nd Posn. Aircraft.	Guns.				Torpedo Tubes.
a.c.	Cornwall .	9800 tons.	440 ft.	66 ft.	24½ ft.	22,000 B. & W.	P. mbroke	Hawthorn	1902	1905	756,274 £	in. 4-2	2-½	in. ..	in. 5	in. 5-4	in. 4	14 6-in., 10 12-pr., 3 3-pr., 9 M.	2	23-6	800 tons.	537
b.	Cornwallis	14,000	405	75½	26½	18,238 B.	Blackwall	Thames S. Co.	1901	1904	1,080,302	7	2-1	7	14	11-6	6	4 12-in., 12 6-in., 12 12-pr., 8 3-pr., & M.	4	18-9	900	750
a.c.	Cressy . shd.	12,000	440	69½	26½	21,210 B.	Govan	Fairfield	1899	1901	749,324	6	3-2	..	5	6	5	2 9-2-in., 12 6-in., 14 12-pr., 3 3-pr., 8 M., 2 l.	2	20-79	800	755
a.c.	Cumberland	9800	440	66	24½	22,000 B.	Glasgow	London & Glasgow Co.	1902	1904	718,168	4-2	2-½	..	5	5-4	4	14 6-in., 10 12-pr., 3 3-pr., 9 M.	2	23-0	800	537
a.c.	Defence .	14,600	490	74½	26	27,000 Yz	Pembroke	Scotts S. & E. Co.	1907	1909	1,383,744*	6-4	1-½	3	..	8	7	4 9-2-in., 10 7-5-in., 16 Q.F.	5	23-5	1000	755
a.c.	Devonshire	10,850	450	68½	25	21,475 Nlc. & cyl.	Chatham	Thames Ironworks	1904	1905	850,877*	6-2	2-½	..	4½	6	6	4 7-5-in., 6 6-in., 2 12-pr., 22 3-pr., 2 M.	2	22-25	800	655
b.	Dominion	16,350	425	78	26½	18,438 B. & W. & cyl.	Barrow	Vickers	1903	1905	1,455,190*	9	2-1	8-7	12	12-6	7	4 12-in., 4 9-2-in., 10 6-in., 14 12-pr., 16 3-pr., M.	4	19-5	950	781
a.c.	Donegal .	9800	440	66	24½	22,000 B.	Govan	Fairfield Co.	1902	1903	715,947	4-2	2-½	..	5	5-4	4	14 6-in., 10 12-pr., 3 3-pr., 9 M.	2	23-0	800	537
a.c.	Drake .	14,100	500	71	26	31,450 B.	Pembroke	Humphrys	1901	1902	1,002,977	6	3-2	..	5	6-5	5	2 9-2-in., 16 6-in., 14 12-pr., 3 3-pr., 2 M.	2	24-11	1250	900
b.	Dreadnought	17,900	490	82	26½	27,500 B. & W.	Portsmouth	Vickers†	1906	1906	1,813,100*	11	2½-1½	..	11	11-8	..	10 12-in., 27 12-pr. Q.F.	5	21-85	900	800
a.c.	Duke of Edinburgh	13,550	480	73½	27	23,685 B. & W. & cyl.	Pembroke	Hawthorn Leslie	1904	1906	1,201,687*	6-4-3	¾-1	6	6	6	6	6 9-2-in., 10 6-in., 2 12-pr., 28 3-pr., 2 M.	3	22-84	1000	704
b.	Duncan .	14,000	405	75½	26½	18,222 B.	Blackwall	Thames S. Co.	1901	1903	1,023,147	7	2-1	7	14	11-6	6	4 12-in., 12 6-in., 12 12-pr., 8 3-pr., & M.	4	18-9	900	750

b.	Empress of India	14,150	380	75	27½	13,000	Pembroke	Humphrys	1891	1893	846,321	18-5 comp.	3	5	16 comp.	17-6 comp.	6-2 K.M.C.	4 18-5-in., 10 6-in., 16 6-pr., 12 8-pr., 2 M., 2 L.	3 18-0	900	740
a.e.	Essex	.	9,800	410	66	24½	22,000 B.	Pembroke	J. Brown	. 1901	1903	736,557	4-2 K.S.	2-½	..	5	5	4 14 6-in., 10 12-pr., 3 8-pr., 8 M., 2 L.	2 23-0	800	537
a.e.	Euryalus	. shd.	12,000	440	69½	26½	21,318 B.	Barrow	. Vickers	. 1901	1904	782,901	6 K.S.	3-2	2	5	5	2 9-2-in., 12 6-in., 14 12-pr., 3 8-pr., 8 M.	2 21-63	800	755
b.	Exmouth	.	14,000	405	75½	26½	18,346 B.	Birkenhead	Laird	. 1901	1903	1,032,409	7 K.S.	2-1	7	14	11-6	4 12-in., 12 6-in., 12 12-pr., 8 8-pr., & M.	4 19-0	900	750
b.	Formidable	.	15,000	400	75	26½	15,000 B.	Portsmouth	Earle	. 1898	1901	1,022,745	9 H.S.	3-2	2	12	12-5	4 12-in., 12 6-in., 18 12-pr., 8 8-pr., & M.	4 18-0	900	781
b.	Glory	.	12,950	390	74	26	13,500 B.	Birkenhead	Laird	. 1899	1901	841,014	6 H.S.	3-2	6	12	12-5	4 12-in., 12 6-in., 12 12-pr., 8 8-pr., & M.	4 18-25	800	700
b.	Goliath	.	12,950	390	74	26	13,500 B.	Chatham	Penn	. 1898	1900	866,006	6 H.S.	3-2	..	5	6-5	5 2 9-2-in., 18 6-in., 14 12-pr., 3 8-pr., 2 M.	2 23-5	1250	900
a.e.	Good Hope	.	14,100	500	71	26	31,071 B.	Govan	. Fairfield	. 1901	1902	990,759	6 K.S.	3-2	..	5	5-4	4 7-5-in., 6 6-in., 12-pr., 22 8-pr., 2 M.	2 23-47	800	655
a.e.	Hampshire	.	10,850	450	68½	25	21,508 Y. & cyl.	Elswick	. Hawthorn	. 1903	1905	866,527*	6-2 K.S.	2-½	..	5	5-4	4 12-in., 12 6-in., 18 12-pr., 12 8-pr., 2 M., 2 L.	5 17-5	900	757
b.	Hannibal	.	14,900	390	75	27½	12,000	Pembroke	Harland	. 1896	1897	906,799	9 H.S.	4-2½	9	14-9	14-6	6 12-in., 12 6-in., 18 12-pr., 12 8-pr., 2 M., 2 L.	5 17-5	900	757
b.	Hibernia	.				26½	18,000 (B. & W. & cyl.)	Devonport	Harland & Wolff	. 1905	1906	1,444,828*	9 H.S.	2-1	8-7	12	12-6	7 12-in., 4 9-2-in., 10 6-in., 14 13-pr., 16 3-pr., & M.	4 19-0	950	781
b.	Hindustan	.	16,350	425	78	26½	18,521 (B. & W. & cyl.)	Clydebank	J. Brown	. 1903	1905	1,454,526*	9 K.S.	2-1	8-7	12	12-6	7 12-in., 4 9-2-in., 10 6-in., 14 13-pr., 16 3-pr., & M.	4 19-0	2150	
a.e.	Hogue	. shd.	12,000	440	69½	26½	21,432 B.	Barrow	. Vickers	. 1900	1902	749,809	6 K.S.	3	2	5	6	5 2 9-2-in., 12 6-in., 14 12-pr., 3 8-pr., 8 M., 2 L.	2 22-6	800	755
t.	Hood	.	14,150	380	75	27½	13,000	Chatham	Humphrys	1891	1893	849,252	18 comp.	3	5	17	18-6	6-2 4 18-5-in., 10 6-in., 10 6-pr., 12 8-pr., 2 M., 2 L.	3 17-5	900	780

* Total estimated cost of ship including guns.

† Turbine machinery of Parsons type.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse- Power.	Where Built.	Maker of Engines.	Date of Launch.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.		
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Second- ary.	Guns.	Torpedo Tubes.					
b.	Illustrious	14,900 tons.	390 ft.	75 ft.	27½ ft.	12,000	Chatham	Penn	1896	1898	894,585 £	in. 9	4-2½	in. 9	14-9	in. 6	6	4 12-in., 12 6-in., 18 12-pr., 12 3-pr., 2 M., 2 L.	5	17.5 knots.	900 tons.	757	
b.	Implacable	15,000 tons.	400 ft.	75 ft.	26½ ft.	15,000 B.	(D'port	Laird	1899	1902	989,116	H.S.										2500	
b.	Irresistible						(Chatham	Maudslay	1898	1901	1,048,136												
a.c.	Invincible	17,250 tons.	530 ft.	78½ ft.	26 ft.	41,000	(Elswick.	Humph'ys†	1907	1909	1,768,995*	7-4	25½	1000	731
a.c.	Inflexible						(Clyde'bk	J. Brown	1907	1908	1,728,229*												
a.c.	Indomitable						(Govan	Fairfield†	1907	1908	1,761,080*												
a.c.	Indefatigable	18,000†	570	80	..	45,000	Devon'p't	J. Brown	† Bldg.	..	..	..	..	..	..	..	..	..	..	28	..	..
b.	Jupiter	14,900	390	75	27½	12,000	Clyde'bk	Thomson	1895	1897	902,011	9	4-2½	9	14-9	14-6	6	4 12-in., 12 6-in., 18 12-pr., 12 3-pr., 2 M., 2 L.	5	17.5	900	757	
a.c.	Kent.	9800	440	66	24½	21,000 B.	Portsmouth	Hawthorn	1900	1903	700,283	4-2	2-¾	..	5	5-4	4	14 6-in., 10 12-pr., 3 3-pr., 8 M., 2 L.	2	24	800	537	
b.	King Edward VII.	16,350	425	78	26½	18,138 B. & W. & cyl.	Devon'p't	Harland	1903	1905	1,473,245*	9	2-1	8-7	12	12-6	7	4 12-in., 4 9-2-in., 10 6-in., 14 12-pr., 16 3-pr., M.	4	19.04	924	781	
a.c.	King Alfred	14,100	500	71	26	30,893	Barrow	Vickers	1901	978,125	8-5-4 2½-1	..	5	6-5	5	6-5	5	2 9-2-in., 16 6-in., 14 12-pr., 3 3-pr., 2 L.	2	23.46	1250	813	
	Leviathan.	(31,203 B.	Clyde'bk	J. Brown	1,012,959																		
a.c.	Lancaster	9800	440	66	24½	22,000 B.	Elswick	Hawthorn	1902	1904	732,858	4-2	2-¾	5	5-4	4	14 6-in., 10 12-pr., 3 3-pr., 9 M.	2	23.0	800	537		

b.	London	15,000	400	75	26½	15,000 B.	Portam'th Earle	1899	1902	1,036,393	9	3-2	2	12 K.S.	12-5 K.S.	6	4 12-in., 12 6-in., 8 3-pr., & M.	4 18-0	900	781
b.	Lord Nelson	16,500	410	79½	27	16,750 B. & W.	Jarrow Palmer	1906	1908	1,654,098*	12-6 K.O.	8	8	8	12	..	4 12-in., 10 9-2-in., 24 12-pr., 5 3-pr., 5 M.	5 18-9	900	747
b.	Magnificent	14,900	390	75	27½	12,000	Chatham Penn	1894	1895	908,789	9	4-2½	9	14-9 H.S.	14-6 H.S.	6	4 12-in., 12 6-in., 18 12-pr., 12 3-pr., 2 M., 2 l.	5 17-5	900	757
b.	Majestic	14,900	390	75	27½	12,000	Portam'th Barrow	1895	1895	916,382	9 H.S.									
b.	Mars	14,900	390	75	27½	12,000	Birkenh'd Laird	1896	1897	902,402										
a.e.	Minotaur	14,600	490	74½	26	27,856 B. & W.	Devonp't Harland & Wolff	1906	1908	1,438,065*	C-4	1-½	6	..	8	7	4 9-2-in., 10 7-5-in., 16 Q.W.	5 23-01	1000	755
a.e.	Monmouth	9800	440	66	24½	22,000 B.	Glasgow London & Shiping.Co	1901	1903	979,591	4-2 K.S.	2-½	4	5	5-4	4	14 6-in., 10 12-pr., 3 3-pr., 8 M., 2 l.	2 23-0	800	597
a.e.	Natal	13,550	480	73½	27	23,592 Y² & Cyl.	Barrow Vickers	1905	1906	1,218,244*	6-4-3 K.S.	½-1	6	6	6	6	6 9-2-in., 4 7-5-in., 2 12-pr., 28 3-pr., 2 M.	3 23-38	1000	704
b.	Neptune	29,000†	600	86	..	..	Portam'th Harland & Wolff	..	..	..	..	..	..	..	..	..	..	..	..	..
b.	New Zealand	16,350	425	78	26½	18,440 Nic. & Cyl.	Portam'th Humphrys	1904	1905	1,424,375*	9 K.S.	2-1	8-7	12	12-6	7	4 12-in., 4 9-2-in., 10 6-in., 14 12-pr., 16 8-pr., M.	4 18-59	950	781
t.	Nile	11,940	345	73	27½	12,000	Pembroke Maudslay	1888	1890	890,283	20-16 comp.	3	3	18-14 comp.	18	..	4 13-5-in., 6 6-in., 22 6-pr., 3-pr., & M.	3 16-7	900	558
b.	Ocean	12,950	390	74	25½	13,500 B.	Devonport Hawthorn	1898	1900	883,778	6 H.S.	2-1	6	12	12-5	5	4 12-in., 12 6-in., 12 12-pr., 8 3-pr., & M.	4 18-25	800	700
b.	Prince George	14,900	390	75	27½	12,000	Portam'th Humphrys	1895	1896	895,504	9 H.S.	4-2½	9	14-9 H.S.	14-6 H.S.	6	4 12-in., 12 6-in., 18 12-pr., 12 3-pr., 2 l.	5 17-5	900	757
b.	Prince of Wales	15,000	400	75	26½	15,000 B.	Chatham Greenock Foundry	1902	1904	1,114,079	9 K.S.	2-1	3	12	12-6	6-2	4 12-in., 12 6-in., 18 12-pr., 8 3-pr., & M.	4 18	900	781
b.	Queen	15,000	400	75	26½	15,000 B. & W.	Devonport Harland & Wolff	1902	1904	1,074,999			..							
b.	Renown	12,350	390	72	26½	12,000	Pembroke Maudslay	1895	1896	709,706	8-6 H.S.	3-2	..	10-6 H.S.	10	6-2	4 10-in., 10 6-in., 14 12-pr., 12 3-pr., 2 M., 2 l.	5 18-0	900	674

* Estimated cost of ship including guns.

† Turbine machinery.

‡ Doubtful.

Exceeded on trial.

GREAT BRITAIN.—Armoured Ships—continued.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour.					Armament.		Speed.	Coal.	Complement.
		tons.	f.	f.	f.						£	Belt.	Deck.	Slide above Belt.	Bulkhead.	Heavy Guns.	Gun Position.	Torpedo Tubes.	knots.	tons.	
b.	Ramillies .	14,150	380	75	27½	13,000	Glasgow	Thomson	1892	1893	902,600	18-5	3	5-4	16	17	6-2	8	17.5	900	780
b.	Repulse .	14,150	380	75	27½	13,000	Pembroke	Humphrys	1892	1894	851,474	comp.		N.S.	comp.	comp.	K.N.O.	(2 sub.)		1450	
b.	Resolution	14,150	380	75	27½	13,000	Jarrow .	Palmer	1892	1893	875,522										
b.	Revenge .	14,150	380	75	27½	13,000	Jarrow .	Palmer	1892	1895	876,101										
b.	Royal Oak	14,150	380	75	27½	13,000	Birkenhead	Laird	1892	1894	899,272										
b.	Royal Sovereign	14,150	380	75	27½	13,000	Portsmouth	Humphrys	1891	1892	839,136										
a.c.	Roxburgh.	10,850	450	68½	25	22,102	Glasgow	London & Glasgow Company	1904	1905	862,077*	6-2	2-½	..	4½	6	6	2	23.63	800	655
b.	Russell .	14,000	405	75½	26½	18,229	Jarrow .	Palmer	1901	1903	1,037,995	7	2-1	7	14	11-6	6	4	19.3	900	750
b.	St. Vincent	19,250	500	84	27	24,500	Portsmouth	Scott's S.†	1908	..	1,745,210	..	..	..	..	..	..	..	21	900	870
a.c.	Shannon .	14,600	490	75½	25	28,553	Chatham	Humphrys	1906	1908	1,423,410*	6-4	1-½	3	..	8	..	5	22.49	950	755
a.c.	Suffolk .	9800	440	66	24½	22,000	Portsmouth	Humphrys	1903	1904	722,681	4-2	2-½	..	5	5-4	4	2	24.7	800	537
						Nic.						K.S.			K.S.	N.S.	K.S.			1600	

a.c.	Sutlej	shd. 12,000	440	69½	26½	21,261	Clydebank J. Brown	1899 1902	755,690	6	3-2	..	5	6	5	29-2-in., 12 6-in., 14 12-pr., 3 3-pr., 8 m., 2 l.	2	21-77	800 755
b.	Superb					23,000	Elswick	1907 1909	1,676,529*	11	..	..	11	11	..	10 12-in., 16 4-in.	..	20-75	900 870
b.	Temeraire					23,000	Devonport Hawthorn	1907 1909	1,751,144*	11	..	..	11	11	..	10 12-in., 16 4-in.	..	22-07	900 870
b.	Swiftsure					23,000	Elswick	1903 1904	845,036	7	3	7	..	10	7	4 10-in., 14 7-5-in., 14 14-pr., 2 12-pr., 12 6-pr., & m. & s.	2	19-6	800 700
b.	Triumph					23,000	Barrow	1903 1904	845,479	7	3	7	..	10	7	4 10-in., 14 7-5-in., 14 14-pr., 2 12-pr., 12 6-pr., & m. & s.	2	19-6	800 700
b.	Trafalgar					23,000	Portsmouth	1887 1890	819,192	20-16	3	3	18-14	18	..	4 13-5-in., 6 6-in., 22 6-pr., 3-pr., & m.	3	16-7	900 572
b.	Vanguard					23,000	Barrow	1909	1,624,872	..	..	..	..	..	..	10 12-in., 20 4-in.	..	21	900 870
b.	Victorious					23,000	Chatham	1895 1897	885,212	9	3-2½	9	14-9	14-6	6	4 12-in., 12 6-in., 18 12-pr., 12 3-pr., 8 m., 2 l.	5	17-5	900 757
b.	Venerable					23,000	Chatham	1899 1902	1,092,753	7	4-2½	3	14	11-6	6-2	4 12-in., 12 6-in., 18 12-pr., 8 3-pr., & m.	2	18-3	900 781
b.	Vengeance					23,000	Barrow	1899 1901	836,417	6	2-1	6	12	12-6	5	4 12-in., 12 6-in., 12 12-pr., 8 3-pr., & m.	4	18-5	800 750
a.c.	Warrior					23,641	Pembroke Wallsend	1905 1907	1,186,393*	6-4-3	3-1	6	6	6	6	6 9-2-in., 4 7-5-in., 2 12-pr., 28 3-pr., 2 m.	3	22-33	1000 704
4 Armoured ships†							1 Portsmouth 1 Devonport 2 by contract.												

* Total estimated cost of ship, including guns.

† Programme 1909-10.

‡ Turbine machinery.

§ The Triumph carries only 3 6-pr., but has an additional torpedo tube.

The battleship **Camperdown** has been struck out of the "fighting division of the Navy," but her armament has not been removed, and she is shown in the official Navy List as available for "subsidiary purposes."

GREAT BRITAIN.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	Deck.	Gun Position.	Guns.	Torpedo Tubes.	knots.	tons.	
Scout.	Adventure	2940	374	38½	13½	15,850 Y mod.	Elswick	Hawthorn.	1904	1905	270,263	2	In.	10 12-pr., 8 3-pr.		25·42 f	150	268
P. 3rd cl. Cr.	Æolus	3600	300	43	17½	9000	Devonport	Hawthorn.	1891	1893	213,180	2-1	2	2 6-in., 6 4 7-in., 1 12-pr., 13 6-pr., 3 pr., M.	3	19·75	400 535	273
P. 3rd cl. Cr.	Amethyst	3000	360	40	14½	14,200 Y mod.	Elswick	Parsonet	1903	1905	228,426	..	..	12 4-in., 11 3-pr., M.	2	23·42 f	300	296
P. 1st cl. Cr.	Amphitrite	11,000	435	69	25½	18,000 B.	Barrow	Vickers	1898	1900	552,795	4	3-6 H.S.	16 6-in., 14 12-pr., 3 3-pr., 2 M.	3 (1 sub.)	20·75	1000	677
P. 1st cl. Cr.	Andromeda	11,000	435	69	25½	16,500 B.	Pembroke	Hawthorn.	1897	1900	574,916	3-6	3-6 H.S.	16 6-in., 14 12-pr., 4 3-pr., 2 M.	4	20·5	1000	600
P. 1st cl. Cr.	Argonaut	11,000	435	69	25½	18,000 B.	Govan	Fairfield	1898	1900	545,756	4		16 6-in., 14 12-pr., 3 3-pr., 2 M.	3 (1 sub.)	20·75	1000	677
P. 1st cl. Cr.	Ariadne	11,000	435	69	25½	18,000 B.	Clydebank	J. Brown	1898	1900	541,927							
P. 2nd cl. Cr.	Arrogant	5750	320	57½	21	10,000 B.	Devonport	Earle	1896	1898	279,248	1-2 N.S.	3	10 6-in., 9 12-pr., 5 3-pr., M.	2	19·6	500	480
P. 3rd cl. Cr.	Astræa	4360	320	49½	19	9112	Devonport	Devonport	1893	1894	254,217	2-1	8	2 6-in., 8 4 7-in., 1 12-pr., 13 6-pr., 3-pr., M.	3	19·75	400	312
Scout.	Attentive	2940	374	38½	13½	16,212 Y.	Elswick	Hawthorn.	1904	1906	270,263	2	3	10 12-pr., 8 3-pr.	2	25·88 f	150	268
P. 3rd cl. Cr.	Barham	1830	280	35	13½	4700 T.	Portsmouth	Hawthorn.	1889	1890	113,702	2-1	2	6 4 7-in., 4 3-pr., 2 M.	2	18·6	140	169

P. 3rd cl. Cr. Bellona	3300	385	41½	13½	18,000 Y.	Pembroke	Fairfield †	Bldg.	..	284,589	..	..	....	..	25	450	275
P. 3rd cl. Cr. Boadicea	3300	385	41	13½	18,000 Y.	Pembroke	J. Brown †	1908	..	332,097*	..	..	6 4-in., and M.	..	25	450	275
P. 3rd cl. Cr. Brilliant	3600	300	48½	17½	9164	Sheerness	Hawthorn.	1891	1893	218,145	2-1	2	26-in., 6 4 7-in., 1 12-pr., 13 6-pr., 3-pr., M.	3	19·7	400	273
P. 2nd cl. Cr. Bristol	4800	430	47	15½	22,000 Y.	Clydebank	J. Brown †	Bldg.	..	..	..	..	....	..	25	..	..
P. 3rd cl. Cr. Cambrian	4360	320	49½	19	9000	Pembroke	Hawthorn.	1893	1894	244,725	2-1	2	26-in., 8 4 7-in., 8 6-pr., 1 3-pr., 4 M., 1 L.	3	19·5	400	312
P. 2nd cl. Cr. Challenger	5880	355	56	21½	12,500 B.&W	Chatham	Walleend Eng'g Co.	1902	1904	360,194	3-2	..	11 6-in., 9 12-pr., 6 3-pr., 2 M.	2	21·0	500	312
P. 3rd cl. Cr. Charybdis	4360	320	49½	19	9000	Sheerness	Earle	1893	1895	241,029	2-1	2	26-in., 8 4 7-in., 1 12-pr., 13 6-pr., 3-pr., M.	3	19·5	400	312
P. 2nd cl. Cr. Crescent	7700	360	60	23½	12,000	Portsmouth	Penn	1892	1894	392,453	5-1	6	1 9·2-in., 12 6-in., 2 12-pr., 19 6-pr., 3-pr., M.	2	19·7	850	560
P. 1st cl. Cr. Diadem	11,000	435	69	26	16,500 B.	Govan	Fairfield	1896	1899	554,863	4-2½	4½-2	16 6-in., 14 12-pr., 4 3-pr., 2 M.	2	20·5	1000	357
P. 3rd cl. Cr. Diamond	3000	360	40	14½	10,000 N. L.	Birkenhead	Laird	1904	1905	231,010	..	..	12 4-in., 11 3-pr., M.	2	22·17 ½	300	296
P. 2nd cl. Cr. Diana	5600	350	54	21	9600	Govan	Fairfield	1895	1898	253,009	..	..	..	3	19·5	550	470
" " Dido	5600	350	54	21	9600	Glasgow	London and Glasgow Co.	1896	1898	254,190	2½	3	11 6-in., 9 12-pr., 6 3-pr., 5 M., 1 L.	3	19·5	550	470
" " Doris	5600	350	54	21	9600	Barrow	Vickers	1896	1898	256,306	..	..	..	3 (2 sub.)	19·5	550	470

* Total estimated cost of ship including guns.

† Turbine machinery.

GREAT BRITAIN.—Cruising Ships, &c.—continued.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.	h.p.					£	Deck.	Gun Position.	Guns.	Torpedo Tubes.	knots.	tons.	
P. 2nd cl. Cr.	Eclipse	5600	350	53	20½	9600	Portsmouth	Portsmouth	1894	1897	276,313	1½-3	in. 3	11 6-in., 9 12-pr., 6 3-pr., 5 m., 1 l.	3	19.5	550	477
P. 2nd cl. Cr.	Edgar	7350	360	60	23½	12,000	Devonport	Fairfield	1890	1893	410,980	5-1	6	2 9.2-in., 10 6-in., 2 12-pr., 19 6-pr., 3-pr., m.	4	20.5	850	544
P. 2nd cl. Cr.	Encounter	5880	3.5	56	20½	12,500	Devonport	Devonport Dockyard.	1903	1906	370,275	3-2	..	11 6-in., 9 12-pr., 8 3-pr., 2 m.	2	20.75 to 21.0	600	..
P. 2nd cl. Cr.	Endymion	7350	460	60	23½	12,000	Hull	Earle	1891	1894	375,350	5-1	6	2 9.2-in., 10 6-in., 2 12-pr., 19 6-pr., 3-pr., m.	2	20.5	850	544
P. 1st cl. Cr.	Europa	11,000	435	69	26	16,500	Clydebank	Thomson B.	1897	1899	564,690	4-2½	4½-2	16 6-in., 14 12-pr., 4 3-pr., 2 m.	2	20.5	1000	357
P. 3rd cl. Cr.	Flora	4360	320	49½	19	9000	Pembroke	Vickers	1893	1895	242,276	2-1	2	2 6-in., 8 4.7-in., 1 12-pr., 13 6-pr., 3-pr., m.	3	19.5	400	312
"	Forte.	4360	320	49½	19	9000	Chatham	Chatham	1893	1895	240,571	2-1	2	2 6-in., 8 4.7-in., 8 6-pr., 1 3-pr., 4 m., 1 l.	3	19.5	400	312
"	Fox	4360	320	49½	19	9000	Portsmouth	Portsmouth	1893	1895	245,571	2-1	2	2 6-in., 8 4.7-in., 8 6-pr., 1 3-pr., 4 m., 1 l.	3	19.5	400	312
P. Scout	Foresight.	2045	360	39	14	14,277 T.	Govan	Fairfield	1904	1905	285,672	1½-8	..	10 12-pr., 8 3-pr.	2	25.12 to 25.15	150 to 380	268
"	Forward.					15,018 T.					285,926							

P. 2nd cl. Cr.	Furious	shd.	5750	320	57½	21	10,000 B.	Devonp't Earle	1896	1899	275,158	1-2	3	10 6-in., 9 12-pr., 3 3-pr., 5 m., 1 l.	2	19·0	500	480
"	Gibraltar	shd.	7700	360	60	23½	12,000	Glasgow . Napier	1892	1894	373,236	5-1	6	2 9·2-in., 10 6-in., 2 12-pr., 19 6-pr., 3-pr., m.	2	19·7	850	544
"	Glasgow	shd.	4800	430	47	15½	22,000 Y.	(Govan . Fairfield † Dalmuir Beartmore†)	Bldg.	..	..	..	..	..	..	25	..	..
"	Gloucester	shd.	735	230	27	8½	6000	Sheerness	1890	1891	52,416	..	2	2 4·7-in., 3 4-pr.	2	20·0	100	91
T. G. B.	Gossamer	shd.	7350	360	60	23½	12,000	Blackwall Humphrys	1892	1894	372,890	..	6	2 9·2-in., 10 6-in., 2 12-pr., 19 6-pr., 3-pr., m.	2	20·0	850	560
P. 2nd cl. Cr.	Grafton	shd.	1070	250	30½	9	6000	Devonp't Cannell Laird	1894	1895	75,206	..	2	2 4·7-in., 5 6-pr.	5	19·0	100	120
"	Harrier	shd.	1070	250	30½	9	3500	Devonp't Hawthorn	1894	1895	73,036	..	2	2 4·7-in., 5 6-pr.	5	19·0	100	120
P. 2nd cl. Cr.	Hawke	shd.	7350	360	60	23½	12,000	Chatham . Fairfield	1891	1893	400,702	5-1	6	2 9·2-in., 10 6-in., 2 12-pr., 19 6-pr., 3-pr., m.	2	20·0	850	544
T. G. B.	Hebe	shd.	810	230	27	8½	3500	Pembroke Fairfield	1894	1894	77,322	..	2	2 4·7-in., 5 6-pr.	3	19·0	100	120
P. 2nd cl. Cr.	Hermes	shd.	5600	350	54	20½	10,000 B. & W.	Govan . Fairfield	1898	1900 1902	281,776	..	3	11 6-in., 9 12-pr., 8 3-pr., 2 m.	2	20·0	600	477
"	Highflyer	shd.	5600	350	54	20½	10,000	Govan . Fairfield	1898	1900	280,182	1½-3	3	11 6-in., 9 12-pr., 8 3-pr., 2 m.	2	20·0	600	477
"	Hyacinth	shd.	5600	350	54	20½	10,000	Glasgow . London and Glasgow Co.	1898	1901	288,595	..	2	2 6-in., 8 4·7-in., 1 12-pr., 13 6-pr., 3-pr., m.	3	19·5	400	312
P. 3rd cl. Cr.	Hermione	shd.	4360	320	49½	13	9000	Devonp't Thomson	1893	1895	223,324	2-1	2	2 4·7-in., 5 6-pr., m.	5	19·0	100	120
T. G. B.	Hussar	shd.	1070	250	30½	9	3500	Devonp't Hawthorn	1894	1895	72,313	..	2	2 4·7-in., 5 6-pr., m.	5	19·0	100	120

† Turbines.

GREAT BRITAIN.—Cruising Ships, &c.—continued.

Class.	NAME	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Makers of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
												Deck.	Gun Position.	Guns.	Torpedo Tubes.			
P. 3rd cl. Cr.	Indefatigable	3600 shd.	300	43½	17½	9000	Glasgow	London and Glasgow Co.	1891	1892	£ 183,568	in. 2-1	in. 2	2 6-in., 6 4-7-in., 1 12-pr., 13 6-pr., 3-pr., M.	3	knots. 19.75	400	273
P. 2nd cl. Cr.	Isis	5600 shd.	350	54	21	9600	Glasgow	London and Glasgow Co.	1896	1898	253,733	2½	3	11 6-in., 9 12-pr., 6 3-pr., 5 M., 1 L.	3 (2 sub.)	19.5	550	470
"	Juno	5600 shd.	350	54	21	9600	Barrow	Vickers	1895	1898	256,106							
T. G. B.	Jason*	810	230	27	8½	5800 R.	Barrow	Vickers	1892	1893 1902	50,161	..	2	2 4-7-in., 4 3-pr., M.	3	21.9 f	100	91
T. G. B.	Leda*	810	230	27	8½	5800 T.	Sheerness	Penn	1892	1894	62,789	2	..	2 4-7-in., 4 3-pr., M.	5	21.8	100	91
P. 2nd cl. Cr.	Liverpool	4800	430	47	15½	22,000 Y.	Barrow	Vickers	Bldg.	..	..	..	..	..	..	25	..	..
3rd cl. Cr.	Medea	2800	265	41	16½	9000 Y.	Chatham	Humphrys	1888	1889 1905	171,874	..	1½	6 6-in., 9 6-pr., 1 3-pr., 3 M., 1 L.	4	19	400	218
P. 2nd cl. Cr.	Minerva	5600 shd.	350	53	20½	9600	Chatham	Chatham	1895	1897	275,331	1½-3	3	11 6-in., 9 12-pr., 6 3-pr., 5 M., 1 L.	2 (2 sub.)	19.5	550	437
"	Newcastle	4800	430	47	15½	22,000 Y.	Essex	Wallsend Eng'g Co.	Bldg.	..	..	..	..	..	..	25	..	..
P. 1st cl. Cr.	Niobe	11,000 shd.	435	69	26	16,500 B.	Barrow	Vickers	1897	1899	548,283	4-2½	4½-2	16 6-in., 14 12-pr., 5 3-pr., 2 M.	2 (2 sub.)	20.5	1000	600
T. G. B.	Niger	810	230	27	8½	6282 R.	Barrow	Vickers	1892	1894 1902	50,572	..	2	2 4-7-in., 4 3-pr., M.	3	20.5 f	100	91
P. Scout	Pathfinder	3000	370	38½	14	17,176 L.N.	Birkenhead	Laird	1904	1905	273,147 273,523	1-½	..	10 12-pr., 8 3-pr.	2	25.34 f	150 380	268
"	Patrol					16,460										25.06 f		

GREAT BRITAIN.—Cruising Ships, &c.—continued.

Class.	NAME.	Displacement.	Length.	Beam.	Draft.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
												Deck.	Gun Position.	Guns.	Torpedo Tubes.			
P. Scout	Skirmisher	tons. 2940	ft. 360	ft. 40	ft. 14½	17,053	Barrow	Vickers	1905	1905	276,579	in. 1½-5	in. ..	10 12-pr., 8 3-pr.	2	knots. 25-19	tons. 150	268
T. G. B.	Skipjack	735	230	27	8½	6000	Chatham	Laird	1889	1890	61,102	..	2	2 4-7-in., 5 3-pr.	5	20-5	100	91
"	Speedwell	735	230	27	8½	6000	Devonport	Laird	1889	1890	60,837							
									1899	1899								
P. 1st cl. Cr.	Spartiate	shd. 11,000	435	69	26	18,658	Pembroke	Maudslay	1898	1902	654,661	4-2½	4½-2	16 6-in., 14 12-pr., 3 8-pr., 2 M.	2 (2 sub.)	21-0	1000	600
P. 3rd cl. Cr.	Sirius	shd. 3600	300	43½	17½	9000	Elswick	Maudslay	1890	1892	190,991	2-1	2	26-in., 6 4-7-in., 1 12-pr., 13 6-pr., 3-pr., M.	4	19-75	400	273
T. G. B.	Speedy	810	230	27	8½	4703	Chiswick	Thornycroft	1893	1894	61,638	..	2	2 4-7-in., 4 3-pr.	3	20-21	100	91
T. B. D.	Swift	1500	345	34½	10½	30,000	Birkenhead	Cannell	1907	1909	250,706*	..	..	4 4-in.	..	36	180	Oil
						L.Y.	Laird											
P. 2nd cl. Cr.	Talbot	shd. 5600	350	53½	21	9600	Devonport	Devonport	1895	1897	263,699	1½-3	3	11 6-in., 9 12-pr., 6 3-pr., 5 M., 1 L.	3 (2 sub.)	19-5	550	433
P. 3rd cl. Cr.	Terpsichore	3400	300	43	16½	9000	Glasgow	Thomson	1890	1892	176,616	2-1	2	2 6-in., 6 4-7-in., 1 12-pr., 13 6-pr., 3-pr., M.	3	20-0	400	275
P. 1st cl. Cr.	Terrible	shd. 14,200	500	71	27	25,000	Glasgow	Thomson	1895	1898	708,619	3-6	6	2 9-2-in., 16 6-in., 14 12-pr., 8 3-pr., 9 M., 2 12-pr. boat.	4	22-4	1500	840
P. 2nd cl. Cr.	Theseus	7350	360	60	23½	12,000	Blackwall	Maudslay	1892	1894	370,359	5-1	6	2 9-2-in., 10 6-in., 2 12-pr., 19 6-pr., 5-pr., M. (2 sub.)	2	20-0	850	544

P. 3rd cl. Cr.	Topaze	3000	360	40	14½	9800	Birkenh'd Laird	1903	1905	242,444	..	..	12 4-in., 11 3-pr., M.	2	22.1	300	296
						L.N.									†		
P. 2nd cl. Cr.	Venus	shd. 5600	350	54	21½	9600	Govan	1895	1898	254,184	2½	3	11 6-in., 9 12-pr., 6 3-pr., 5 M., 1 L.	3	19.5	550	470
"	Vindictive	5750	320	54	20½	10,000	Chatham	1897	1897	282,879	1-2	3	10 6-in., 9 12-pr., 3 3-pr., 5 M., 1 L.	2	20.1	500	450
	4 Bristol Type	Details not published.*															
	2 Ballona Type	<div style="display: flex; justify-content: space-between;"> { Pro. } { Pro. } </div>															

* Programme 1909-10.

River Gunboats.—Robin, Nightingale, Snipe, Sandpiper (1897), 85 tons; Woodcock, Woodlark (1898), 122 tons, 2 6-prs., 4 Maxims; Kinsha (1901), Teal, Moorhen (1902), 180 tons, 2 6-prs., 13 knots; Widgeon (1905).

The following vessels have been struck off the effective list, but the armaments have not in every case been removed:—*3rd Class Cruisers*: Melampus, Pique, Rainbow, Retribution, Spartan, and Tribune, which were built under the Naval Defence Act; Pomone (special service) and Factolus. *Torpedo-Gunboats*: Antelope and Onyx. The following small craft have been placed on a "Special Service List" of "unprotected ships": Sphinx, Lapwing, Redbreast (East Indies), Ringdove (Fishery P.), Dwarf (W. C. Africa), Shearwater (British Columbia), Bramble, Britomart, Clio, and Cadmus (China).

The following vessels are employed on special service:—Assistance and Cyclops, fleet repair ships; Blake, Blenheim, Hecla, Leander, St. George, and Tyne, torpedo depot ships; Bonaventure, Forth, Mercury, Vulcan, Eolus, and Hazard, submarine depot ships; Aquarius, distilling vessel; Iphigenia, Apollo, Naiad, Intrepid, Andromache, Latona, and Thetis, mine-laying vessels; and Circe, mine-sweeper.

Royal Naval Reserved Merchant Cruisers.

	Name.	Owners.	Length.	Breadth.	Draught of Water for the Admiralty List.	Gross Tonnage.	Indicated Horse-Power.	Ocean Speed.
Ships in receipt of an annual subvention and permitted to fly the blue ensign.	Mauretania	Cunard Co.	Feet. 785	Feet. 88	Feet. 33.6	Tons. 38,000	68,000*	Knots. 26.0½*
	Lusitania	"	785	88	33.6	38,000	68,000*	25.40*
	Campania	"	610	65	26	12,950	30,000	21
	Lucania	"	610	65	26	12,952	30,000	21
	Umbria	"	501½	57	26	8,128	14,500	19½

* Results of trials on 1200 miles course. On other trials on 59 miles course Lusitania made 26.45 knots and Mauretania 26.17 knots.

In addition to the above, the Cunard Company holds all vessels for the time being the property of the Company at the disposal of His Majesty's Government for hire or purchase.

ARGENTINE REPUBLIC.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.					Armament.		Speed.	Coal.	Complement.		
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position.	Heavy Guns.	Second-ary.				Guns.	Torped Tubes
c.b.	Almirante Brown .	4267 tons.	240 ft.	50 ft.	20½ ft.	4500	Poplar	1880	1882	270,000 £	in. 9 comp.	1½	in. 8 comp.	in. 7 comp.	in. 8	in. 8	..	10 5.9-in. (Canet), 4 4.7-in., 8 2.4-in., 2 m.	..	13.75 knots.	650 tons.	350
a.c.	Garibaldi .	6732	328	59½	24	13,384	Sestri Ponente	1895	1896	752,000	6-3 H.S.	1½	6 H.S.	6 H.S.	6 H.S.	6	6	2 10-in., 10 6-in., 10 2.2-in., 10 1.4-in., 2 m.*	..	19.9	1000	500
a.c.	General Belgrano .	7069	328	59½	24	13,000	Leghorn	1897	1899	696,700	6-3 H.S.	1½	6 H.S.	6 H.S.	6 H.S.	6	6	2 10-in., 14 6-in., 2 2.2-in., 10 2.2-in., 8 1.4-in., 2 L., 2 m.	4	20.1	1000	500
a.c.	General San Martin	6773	328	59½	24	13,000	Leghorn	1896	1898	688,200	6-3 H.S.	1½	6 H.S.	6 H.S.	6 H.S.	6	6	4 8-in., 10 6-in., 6 4.7-in., 12 2.2-in., 10 1.4-in., 2 L., 2 m.*	4	19.8	1100	500
c.d.s.b.	Independencia .	2336	230	44½	13	3000	Birkenhead.	1891	1893	176,000	8 comp.	2	..	8 comp.	8	8	..	2 9.4-in., 4 4.7-in. (A), 4 3-pr. (A), 4 m.	..	14.4	340	225
c.d.s.b.	Libertad .	2336	230	44½	13	3000	Birkenhead .	1890	1892	176,000	6-3 H.S.	1½	6 H.S.	5 H.S.	5 H.S.	6	6	2 10-in., 10 6-in., 6 4.7-in., 10 2.2-in., 10 1.4-in., 2 m.*	4	20.1	1000	500
a.c.	Pueyrredon .	6773	328	59½	24	13,000	Sestri Ponente	1898	1901	782,000	6-3 H.S.	1½	6 H.S.	6 H.S.	6 H.S.	6	6	10 12-in., 14 6-in.	..	21	..	..
b.	2 projected †	19000	..	..	..	..	..	Pro.	..	..	..	..	..	..	..	..	..	..	..	..	..	..

* Garibaldi, General San Martin, General Belgrano and Pueyrredon have Armstrong guns.

† Possibly 3.

ARGENTINE REPUBLIC.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draft.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
cr.	Buenos Aires	4780 shd.	396	47½	19	17,000	Elswick	1895	1895	£ 385,000	in. ..	in. 4½	2 8-in. (A.), 4 6-in., 6 4-7-in., 16 3-pr., 6 1-pr.	3	knots. 23-2* f	1000†	429
to.g.b.	Espora	520	210	25	8	3500 Y	Birkenhead	1890	1891	..	..	..	3 3-in., 4 1-8-in., 2 m.	1	20-0	180	124
cr.	Nueve de Julio	3570	354	44	19½	14,850	Elswick	1892	1892	293,000	4½	4½	4 6-in. (A.), 8 4-7-in., 12 3-pr., 12 1-pr.	5	22-74 f	770†	300
to.b.g.	Paraná	1000	240	32½	7½	..	Elswick	1908	..	..	1	3-2†	2 6-in. Howitzers, 6 12-pr., 8 m., 4 12-pr. field.	..	15-0	120	150
cr.	Patagonia	1419	220	32½	12½	2400	Trieste	1885	1887	100,000	1½	4	1 10-in., 3 6-in., 6 l., 10 m.	5	13-0	350	210
to.g.b.	Patria	1070	250	31	10	4500	Birkenhead	1893	1894	87,000	..	..	2 4-7-in., 4 8-pr., 2 3-pr., 2 m.	5	20-75 f	288	159
to.g.b.	Rosario	1000	240	32½	7½	..	Elswick	1908	..	..	1	3-2†	2 6-in. Howitzers, 6 12-pr., 8 m., 4 12-pr. field.	..	15-0	120	150
cr.	25 de Mayo	3200	325	43	16	13,800	Elswick	1890	1892	260,000	4½	4½	2 8-2-in. (A.), 8 4-7-in., 12 3-pr., 12 1-pr.	6	22-43 f	600†	185

* Natural draught.

† Bunker capacity.

‡ Sld.

The training-ship (cruiser) Presidente Sarmiento, 2750 tons, 2000 I.H.P. (locomotive and Nielaussse boilers), and 13 knots speed, with 19 guns and three torpedo tubes: launched by Messrs. Laird, 1887. There are several other small gunboats. The torpedo-ram Maipú (1063 tons, 1750 I.H.P.) was built in England in 1880. The Piedrabuena, ex Paraná, 550 tons, is now a transport, and the Uruguay a surveying vessel.

AUSTRIA-HUNGARY.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draft.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.				Armament.		Coal.	Complement.	
											Belt.	Deck.	Side above belt.	Bulkhead.	Gun Position.	Heavy Guns.			Second-ary.	Guns.	Torpedo Tubes.
c.d.s.b.	(Arpád Babenberg)	8208 354½	65½	23½	23½	15,000 B.	Trieste	{ 1901 1903 1902 1904	{ 650,000 667,000	£	in. 8½	in. 2½	in. 4	in. 8	in. 8½	in. 5	3 9-4-in., 2 8-4-in., 8 M., 2 L.	10 knots. 19-6	500 638
c.d.s.	Budapest .	5462 305	55½	21	21	9185 B.	Trieste	1896 1897	400,600		10½	2½	3½	8	10½	3½	4 9-4-in., 6 5-9-in., 12 1-8-in., 6 M., 2 L.	4 17-8	500 450
b.	Erz. Friedrich	18,130				t.	{ Trieste	{ 1904 1906			8½	3	5	8	9½	7	4 9-4-in., 12 7-5-in., 12 3-8-in., 6 1-8-in., 8 M., 2 L.	2 20-36	1315 ..
b.	Erz. Karl	18,000	72½	24½	24½	Y.	Trieste	{ 1903 1906 1905 1907	{ 912,500 912,500		8½	3	5	8	9½	7	4 9-4-in., 12 7-5-in., 12 3-8-in., 6 1-8-in., 8 M., 2 L.	2 20-0	1315 ..
b.	Erz. Ferdinand Max	20,000				Y.	{ Trieste	{ 1903 1906 1905 1907	{ 912,500 912,500		8½	3	5	8	9½	7	4 9-4-in., 12 7-5-in., 12 3-8-in., 6 1-8-in., 8 M., 2 L.	2 20-0	1315 ..
b.	Erz. Franz Ferdinand	15,000 430	82	26½	26½	Y.	Trieste	1908 ..	..		9-4	2	6	6	10	8	4 12-in., 8 9-4-in., 20 3-9-in., 2 3-pr., 2 M.	3 20-0	750 ..
b.	Habsburg.	8208 354½	65½	23½	23½	15,000 B.	Trieste	1900 1902	626,000		8½	2½	4	8	8½	5	3 9-4-in., 12 5-9-in., 10 2-8-in., 8 M., 2 L.	2 19-6	500 638
a.o	Kaiserin Maria Theresia	5187 351	52½	21½	21½	9755	Trieste	1893 1895	304,187		4	2	..	4	4	4	2 9-4-in., 8 5-9-in., 14 1-8-in., 6 M., 2 L.	4 19-0	740 502
a.o	Kaiser Karl VI.	6151 367½	56	20½	20½	12,800 B.	Trieste	1898 1900	429,000		10	1½	6	8	8½	6	2 9-4-in., 8 5-9-in., 16 1-8-in., 4 M., 2 L.	4 20-7	800 535
c.d.s.	Monarch .	5550 305	55½	21	21	8900	Pola	1895 1898	399,062		10½	2½	3½	8	10½	3½	4 9-4-in., 6 5-9-in., 12 1-8-in., 6 M., 2 L.	4 17-4	500 450
b.	Radetzky	15,000 430	82	26½	26½	20,000 Y.	Trieste	Bag. ..	..		9-4	2	6	6	10	8	4 12-in., 8 9-4-in., 20 3-9-in., 2 3-pr., 2 M.	3 20-0	750 ..
a.c.	St. Georg .	7185 383½	61½	21½	21½	15,270 t. Y.	Pola	1903 1906	581,583 3½-6½		8½	1½	5	7	8½	6	2 9-4-in., 5 7-5-in., 4 5-9-in., 9 2-5-in., 14 M., 2 L.	2 22	1000 ..
c.d.s.	Wien .	5550 305	55½	21	21	8480	Trieste	1895 1897	397,850		10½	2½	3½	8	10½	3½	4 9-4-in., 6 5-9-in., 12 1-8-in., 6 M., 2 L.	4 17-6	500 450
b.	Zrinyi .	15,000 430	82	26½	26½	20,000 Y.	Trieste	Bag. ..	..		9-4	2	6	6	10	8	4 12-in., 8 9-4-in., 20 3-9-in., 2 3-pr., 2 M.	3 20-0	750 ..

Six armoured river monitors, Bodrog, Körös, Leitha, Maros, Szamos, and Temeş, of 300-437 tons displacement.
Three battleships, 18,000-19,000 tons, projected.

AUSTRIA-HUNGARY.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
to. cr.	Admiral Spaun*	3500 tons.	411 ft.	42 ft.	15 ft.	20,000 Y. tur.	Pola	1889	..	£ ..	1 in.	in.	7 3-9-in., 2 m.	2	knots. 26-0	tons. ..	..
to. cr.	Aspern . .	2362	301½	89½	14½	7300 Y.	Pola	1889	1901	155,000	2	..	8 4-7-in., 8 1-8-in., 4 m.	1	20-0	470	289
to. g. b.	Blitz . .	354	193½	22½	8	3500	Elbing	1888	1889	..	..	..	8 1-8-in.	4	21-0	250	59
cr. 2nd cl.	Kaiserin Elisabeth	4000	321½	47½	18½	8000	Pola	1890	1892	..	2½	3½	2 9-4-in. (K.), 6 5-9-in. do., 13 1-8-in., 4 m., 2 l.	5	19-0	630	418
cr. 2nd cl.	Kaiser Franz Josef I.	3666	321½	47½	18½	8000	Trieste	1889	1891	..	2½	3½	2 9-4-in. (K.), 6 5-9-in. do., 16 1-8 in., 2 l.	5	19-0	630	426
to. g. b.	Komet . .	354	193½	22½	8	3500	Elbing	1888	1889	..	..	..	9 1-8-in.	4	21-0	50	59
cr. 3rd cl.	Leopard.	1506	224	34	14	6000	Elswick	1886	1888	200,000	..	..	2 4-7-in., 10 1-8-in.	4	18-3	250	186
to. g. b.	Magnet . .	502	220	26½	8	5000	Elbing	1896	1899	51,052	..	..	6 1-8-in.	3	26-0	105	80
to. g. b.	Meteor . .	344	187	22½	8	3500	Elbing	1887	1889	..	..	..	9 1-8-in.	4	23-1	120	59
cr. 3rd cl.	Panther.	1506	224	34	14	6000	Elswick	1885	1887	..	..	..	2 4-7-in., 10 1-8-in.	1	18-5	250	186
T. D. S.	Pelikan . .	2431	279	39½	15½	4600	Elbing	1891	1893	..	..	..	2 5-9-in. (K.), 8 smaller.	4	18-0	..	198
to. g. b.	Planet . .	492	210	23	8½	3500	Jarrow	1889	1890	..	..	..	2 2-8-in., 8 1-8-in.	3	19-6	78	84
to. g. b.	Satellit . .	531	220	26½	9½	4000	Elbing	1893	1893	..	1½	..	1 2-8-in., 8 1-8-in.	..	21-87	76	84
to. cr.	Szigetvár . .	2313	301½	39½	14½	7300 Y.	Pola	1889	1901	155,000	2	..	8 4-7-in., 8 1-8-in., 4 m.	1	20-0	470 500	289
to. g. b.	Trabant . .	522	220	23	8½	3500	Trieste	1890	1891	..	..	..	2 2-8-in., 8 1-8-in.	3	20-0	..	84
to. cr.	Zenta . .	2264	301½	39½	12½	7300 Y.	Trieste	1897	1899	143,780	2	..	8 4-7-in., 8 1-8-in., 4 m.	1	20-9 f	470 500	289

* 2½ in. side armour and 2 in. bulkhead.

Four screw gunboats, between 540 and 870 tons displacement and 250 and 950 indicated horse-power.
Five patrol boats (30 tons, 2000 H.P.) have been completed for the Danube, two of them fitted with Parsons turbines.
Donau, training corvette, launched at Pola, 1893 (2307 tons).

BRAZIL.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkheads.	Heavy Guns.	Gun Position.	Guns.	Torpedo Tubes.			
c.d.s., t.	Marshal Deodoro	3112 267½	48	13½	13½	3400 D.A.	La Seyne	{ 1898 1900 1899 1901 }	..	13½-4 H.S.	1½	..	..	8 U.S.	3 H.S.	2 9.4-in., 4 4.7-in., 2 m., 4 6-pr., 2 1-pr.	2 (sub.)	15.0	236	200
c.d.s., t.	Marshal Floriano																				
b.	Minas Geraes	19,500 500	83	25	24,500 B.&W. tur.	Elswick	{ 1908 Bldg. }	..	..	9-4 K.S.	2	9-6 K.S.	9	9 K.S.	6 K.S.	12 12-in., 22 4.7-in., 8 6-pr.	4	21.0	900	..
t.	Rio de Janeiro																				
t.	Riachuelo shd.	5700 305	52	19½	7300 Poplar			1883 1888 1895	1883 1888 365,000* comp.	11	2	..	10 comp.	10 comp.	..	4 9.2-in. (Whitworth, altered by Armstrong), 6 4.7-in., 23-pr., 15 m.	5	16.71	800	450	
b.	São Paulo	19,500 500	83	25	24,500 B.&W. tur.	Barrow	{ Bldg. }	..	..	9-4 K.S.	2	9-6 K.S.	9	9 K.S.	6 K.S.	12 12-in., 22 4.7-in., 8 6-pr.	4	21.0	900	..

* Exclusive of guns and ammunition.

Also three river monitors, Para, Maranhao and Pernambuco.

Two monitors, 335 tons.

BRAZIL.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
cr.	Almirante Tamandare	shd. 4660 tons.	294 ft.	46 ft.	18½ ft.	7500	Brazil	1890	1893	..	in. 1½	in. 3	10 6-in., 2 4-7-in., 8 m.	8	knots. 17-0	tons. 750	450
"	Andrada	. shd. 2559	252½	34	18	3600	Bergen	1890	1892	..	..	..	2 4-7-in., 2 14-pr., 6 6-pr., 6 1-pr.	5	17-0	..	300
"	Bahia	. shd. 3100	380	39	13½	18,000 tur.	Elswick	1909	..	..	3-1½	..	10 4-7-in., 8 1-8-in.	2	26-5	650	..
"	Barroso	. shd. 3600	380	43½	16½	7500	Elswick	1890	1897	..	3	4½ shields	6 6-in., 4 4-7-in., 10 6-pr., 4 1-pr., 4 m.	3	20-0	700	300
"	Benjamin Constant	. shd. 2707	286	46	18	2800	La Seyne	1892	1894	..	2	..	4 6-in., 8 4-7-in., 8 m., 4 l.	4	14-0	260	287
to.cr.	Caramuru	. 1014	249½	30½	10½	6000	Kiel	1896	1897	..	½	..	2 8-9-in., 6 2-2-in., 2 1-4-in.	3	22-5	..	..
to.g.b.	Gustavo Sampaio	. 500	197	21	7½	2500	Elswick	1893	1894	..	..	..	2 20-pr., 4 7-pr.	3	18-0	150	95
cr.	Quinze de Novembro	1300	210	35	13	750	Elswick.	1892	1894	..	2-1	..	6 4-7-in., 4 6-pr., 6 m.	4	17-0	170	160
"	Rio Grande do Sul	. 3100	380	39	13½	18,000 tur.	Elswick	Bldg.	..	..	..	..	10 4-7-in., 8 1-8-in.	2	26-5	650	..
to.cr.	Tamoyo	. 1063	269	28½	9½	6500	Kiel	1898	1900	..	..	..	4½ shields	3	23-0	293	110
"	Timbira	. 1014	249½	30½	10½	7000	Kiel	1896	1897	..	½	..	4½ shields	3	22-5	250	110
g.r.	Tiradentes	. shd. 800	165	30	11	1200	Elswick	1892	1893	..	..	..	4 4-7-in., 3 6-pr., 4 m.	2	14-5	110	107
to.cr.	Tupy	. 1014	249½	30½	10½	7000	Kiel	1896	1897	..	½	..	4½ shields	3	22-5	250	110

Eleven screw gunboats, 200 tons to 400 tons, and four 12-knot river gunboats built at Poplar.

Two river gunboats built by Messrs. Yarrow were sent out in sections, 1907.

CHILI.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.					Armament.		Speed.	Coal.	Complement.	
											Belt.	Deck.	Side above Belt.	Bulkhead.	Heavy Guns.	Gun Position.	Guns.				Torpedo Tubes.
a.c.	Almirante O'Higgins shd.	8500	411½	62½	22	16,000	Elswick	1897	1898	..	7-5	2	..	..	7½-6	6	4 8-in., 10 6-in., 4 4-7-in., 10 12-pr., 10 6-pr., 4 M.	3	21-5	1260	..
b.	Capitão Prat . . shd.	5981	328	60½	21½	12,000	La Seyne	1890	1893	391,000	12	3	4	..	10½	2	6 9-4-in. (Canet), 8 4-7-in. (Canet), 6 2-2-in., 4 1-8-in., 10 1-4-in., 5 M.	4	18-3	775	485
a.c.	Esmeralda . . .	7020	436	53½	22½	16,000	Elswick	1896	1897	..	6	2	..	6	4½	..	2 8-in., 16 6-in., 8 12-pr., 2 3-pr., 4 M.	3	22-8	1350	500

Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						Deck.	Gun Position.	Guns.	Torpedo Tubes.	knots.	tons.	
a.g.b.	Almirante Condell .	750	240	27½	10½	4500	Birkenhead	1890	1892	..	..	..	3 14-pr., 4 3-pr., 2 M.	5	21-0	210	..
"	Almirante Lynch .	812	240	27½	10½	4700	Birkenhead	1896	1896	..	..	4½	2 4-7-in., 4 3-pr.	3	21-0	200	..
cr.	Almirante Simpson .	4400	370	46½	18½	14,500	Elswick	1893	1894	..	4-1½	..	2 8-in., 10 6-in., 12 3-pr., 10 1-pr.*	5	22-78	1900	427
"	Blanco Encalada . shd.	4500	360	46	18½	15,750	Elswick	1901	1903	..	1½-1½	..	2 8-in., 10 4-7-in., 16 1-8-in., 2 M., 1 L.	5	23-0	1000	..
"	Chacabuco . . shd	2330	240	45½	18½	1500	Elswick	1898	1900	..	..	..	4 4-7-in., 2 12-pr., 2 6-pr., 2 M., 1 L.	1	13-7	200	302
"	General Baquedano (Training)	3600	330½	43½	16½	6500	Elswick	1896	1898	..	..	..	8 6-in., 10 6-pr., 4 1-pr.*	3	20-0	800	..
"	Ministro Zenteno . shd.	2047	268	35½	19½	5400	La Seyne	1890	1892	..	9½	..	4 6-in. (Canet), 2 5-in., 4 2-2-in., 6 M.	3	19-0	200	171

* Armstrong.

† Bunker capacity.

‡ Mean draught.

Two Gunboats of 145 tons displacement and one of 180 tons.

CHINA.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draft.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
<i>cr.</i>	Foo-Ching . . .	2500	253	36½	18	2400	..	1893	1895	..	In. 4-2	In. 4½	3 5-in. (K.), 4 M., 2 L.	..	16·0	tons.	..
<i>to g.b.</i>	Fel-Ying . . .	837	257½	28½	12½	4500 Y.	Stettin	1895	1895	..	..	2	2 4-in., 6 3¼-in., 4 smaller	3	21·8	75	90
<i>cr.</i>	Hai-Chi. . . .	4300	396	46½	18½	17,000	Elswick	1898	1899	..	5	6	2 8-in., 10 4·7-in., 12 3-pr., 4 1¼-in., 6 M.	5	24·0	300	374
"	Hai-Shen . . .	2903	314½	41	16	8000	Vulcan, Stettin.	1898	1898	..	3	2	3 6-in. (K.), 8 4-in., 6 1¼-in. Hotchkiss, 6 M.	3 (1 sub.)	20·7	220 500	244
"	Hai-Shew . . .							1897	1898								
"	Hai-Yung . . .							1897	1898								
"	Hi-Ying	2165	253	36½	18	2400	..	1895	1897	..	..	..	2 8-in. (A.), 8 4·7-in., 4 M.	1	21·0	..	..
<i>to cr.</i>	Kien-Wel . . .	861	256	26½	10½	7000 N.S.	Foochow	1900	1902	..	..	..	1 3·9-in., 3 2·5-in., 6 1¼-in.	2	22·5	360	300
"	Kien-Gnan . . .							1899	1902								
<i>to g.b.</i>	Kwang-Ting . .	1000	235	27½	11½	3400	..	1890	1892	..	..	..	3 4·7-in., 4 M., 2 L.	4	16·0	..	120
<i>g.b.</i>	Tchu-Tai . . .	552	..	..	..	..	Kobe.	1906	..	..	..	..	2 4·7-in., 2 12-pr.	..	13·0	..	..

Torpedo-gunboat Pei-Ting (349 tons), four gunboats of 411 tons, two of 300 tons, four of 215 tons (defence of Canton Roads), training vessel Tung-Chi, 1700 tons—all launched 1885-88.

Six river gunboats (752 tons) and one smaller have been built in Japan.

DENMARK.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-power.	Where built.	Date of Launch.	Date of Completion.	Cost.	Armour.					Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Deck.	Bulkhead.	Heavy Guns.	Gun Position.	Second-ary.				Guns.	Torpedo Tubes.
<i>c.d.s., t.</i>	Herluf Trolle	tons. 3415 ft. 271	50	16½	16½	4200 T.	Copenhagen	1899	1901	£	in. 8-4 H.S.	2	in. 7 H.S.	in. ..	in. 6 H.S.	in. 6 H.S.	2 9-4-in., 4 5-9-in., 10 2-2-in., 8 smaller.	3 (sub.) 4 (1 sub.)	knots. 16-0 250	250
<i>b.</i>	Iver Hvitsfeldt	3208 242	49½	18	18	5100	Copenhagen	1886 1889 1900	200,000	12	2	2	..	9½	8	..	2 10-2-in. (K.), 10 6-pr., 8 m.	4	15-6	250 298
<i>c.d.s., t.</i>	Olfert Fischer	3415 271	50	16½	16½	4200	Copenhagen	1903	1905	..	8-4 K.S.	2	7 K.S.	..	6 K.S.	6	2 9-4-in., 4 5-9-in., 10 2-2-in., 8 smaller.	3 (sub.) 4 (1 sub.)	16-0	250 250
<i>c.d.s., t.</i>	Peder Skram	3543 27½	51½	16½	16½	4600	Copenhagen	1908	..	..	8-4 K.S.	2	..	..	7 K.S.	6 K.S.	..	4	16-5	250 250
<i>c.d.s., t.</i>	Skjold	2115 226½	38	13½	13½	2200 T.	Copenhagen	1896 1899	..	9	2	2	..	7	8	4½	1 9-4-in., 3 4-7-in. (K.), 1 8-in., 1 m.	4	13-0	280 210

DENMARK.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gunn Position.					
3rd cl. cr.	Geiser	tons. 1260 ft. 257½	27½	27½	11½	3000 T.	Copenhagen	1892	1893	£	in. 1½	in. ..	2 4-7-in., 4 3-4-in., 6 m.	4	17-1	125	155
"	Heimdal	1260	257½	27½	11½	3000 T.	Copenhagen	1894	1896	..	1½	..	2 4-7-in., 4 3-pr., 6 m.	4	17-5	125	155
"	Hekla	1260	233	32½	11½	3000 T.	Copenhagen	1890	1893	..	1½	..	2 6-in., 4 2-2-in., 6 m.	4	17-0	125	155
cr.	Valkyrien	2854	268	43½	18	5300	Copenhagen	1887 1896	1890	..	2½	..	2 8-2-in. (K.), 6 5-9-in., 4 9-pr., 10 m.	5	17-0	450	300

Gunboats.—Six (*Falster, Lille Belt, Øresund, Store Belt, Grønland, Guldbergund*), of 150 to 240 tons, 200 to 400 I.H.P.

FRANCE.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.				Armament.		Speed.	Coal.	Complement.	
											Belt.	Deck.	Side above belt.	Bulkhead.	Gun Position.	Guns.				Torpedo Tubes.
a.c.	Aube (Amiral)	9856 tons.	453 ft.	66½ ft.	24½ ft.	22,155 B.	St. Nazaire	1902	1904	973,440	in. 6-4	2	in. 5-2	in. ..	in. 7½	in. 6½-5	2 7-6-in., 8 6-4-in., 6 3-9-in., 20 small Q.F. and M.	2 (sub.)	21-9 knots.	970 tons.
t.	Bouvet	12,007 tons.	401½ ft.	70½ ft.	27½ ft.	14,000 B.	Lorient	1896	1898	1,100,770	in. 15½-8	3½	in. 4	in. ..	in. 14½	in. 4	2 12-in., 2 10-8-in., 8 5-5-in., 8 3-9-in., 19 small Q.F. and M.	2 (sub.)	18-2 knots.	621 tons.
t.	Bouvines	6691 tons.	233½ ft.	58½ ft.	23½ ft.	8400 A.D.	La Seyne	1892	1894	594,640	in. 17½	4	in. ..	in. ..	in. 14½	in. ..	2 12-in., 8 3-9-in., 4 1-8-in., 10 1-4 in. M.	2	16-05 knots.	300 tons.
t.	Brennus	11,190 tons.	361 ft.	67 ft.	26½ ft.	14,000 B.	Lorient	1891	1895	991,767	in. 15½	4	in. 4½	in. ..	in. 17½	in. 4½	3 13-4-in., 10 6-4-in., 23 small Q.F. and M.	4	17-1 knots.	800 tons.
a.c.	Bruix	4735 tons.	365½ ft.	46 ft.	19½ ft.	9049 B.	Rocheport	1894	1896	409,622	in. 38-2½	2	in. 3½	in. ..	in. 3½	in. 3½	2 7-6-in., 6 5-5-in., 4 2-5-in., 4 1-8-in., 4 1-4-in., M.	4	18-3 knots.	406 tons.
t.	Caiman	7050 tons.	278½ ft.	59 ft.	24½ ft.	6000 B.	Toulon	1885	1887	..	in. 19½	3	in. ..	in. ..	in. 10	in. ..	2 10-8-in., 6 3-9-in., 10 1-8-in., 4 1-4-in., 2 M.	2 (sub.)	14-5 knots.	400 tons.
t.	Carnot	11,351 tons.	382½ ft.	70½ ft.	27½ ft.	16,300 D'A.	Toulon	1894	1896	1,070,088	in. 17½-9	2½	in. 4	in. ..	in. 14½	in. 4	2 12-in., 2 10-8-in., 8 5-5-in., 4 2-5-in., 16 1-8-in., M.	2 (sub.)	17-86 knots.	765 tons.
	Charlemagne	11,108 tons.	385½ ft.	66½ ft.	27½ ft.	14,500 D'A.	Brest	1895	1898	1,096,432	in. 15½	3½	in. 3	in. ..	in. 15½	in. 3	4 12-in., 10 5-5-in., 8 3-9-in., 16 1-8-in., 10 1-4 in. M.	2 (sub.)	18-1 knots.	680 tons.
t.	Charles Martel	11,633 tons.	392½ ft.	71 ft.	27½ ft.	14,906 D'A.	Brest	1893	1897	1,092,830	in. 17½	3½	in. 4	in. ..	in. 15½	in. 4	2 12-in., 2 10-8-in., 8 5-5-in., 4 2-5-in., 14 1-8-in., M.	2 (sub.)	18-1 knots.	677 tons.
a.c.	Charner (Amiral)	4702 tons.	348 ft.	46 ft.	19½ ft.	8300 D'A.	Rocheport	1893	1895	353,200	in. 38-2½	2	in. 3½	in. ..	in. 3½	in. 3½	2 7-6-in., 6 6-5-in., 14 small Q.F. and M.	4	18-2 knots.	413 tons.
a.c.	Condé	9856 tons.	453 ft.	63½ ft.	24½ ft.	22,175 Nic.	Lorient	1902	1904	863,799	in. 6-4	2	in. 5-2	in. ..	in. 7½	in. 6½-5	2 7-6-in., 8 6-4-in., 6 3-9-in., 16 1-8-in., 6 1-4-in.	2 (sub.)	21-4 knots.	970 tons.
	Condorcet.	7,710 tons.	476 ft.	84 ft.	27 ft.	5000 tur.	St. Nazaire	Bldg.	..	2,000,824	in. 10-8	2½	in. 8½	in. ..	in. 12	in. 8½	4 12-in., 12 9-4-in., 16 12-pr., 8 3-pr., 2 1-pr.	2 (sub.)	19-0 knots.	960 tons.
t.	Danton	7,710 tons.	476 ft.	84 ft.	27 ft.	5000 tur.	Brest	Bldg.	..	1,803,224	in. 10-8	2½	in. 8½	in. ..	in. 12	in. 8½	4 12-in., 12 9-4-in., 16 12-pr., 8 3-pr., 2 1-pr.	2 (sub.)	19-0 knots.	960 tons.
t.	Démocratie	14,635 tons.	438½ ft.	79½ ft.	27½ ft.	19,190 B.	Brest	1904	1907	1,473,180	in. 11-7	2½	in. 8	in. ..	in. 12	in. 6	4 12-in., 10 7-6-in., 26 1-8-in., 2 1-4-in.	2 (sub.)	19-4½ knots.	905 tons.

FRANCE.—Armoured Ships—continued.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.					Armament.		Speed.	Coal.	Complement.	
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position.	Heavy Guns.	Second- Ary.				Torpedo Tubes.
a.c.	Desaix	shd. 7578 426½	58½	24½	17,715	St. Nazaire	1901	1903	762,759	4-3	in.	2½	in.	in.	3½	in.	..	8 6-4-in., 4 3-9-in., 10 1-8-in., 4 1-4-in.	2	21-7	880 531
t.	Diderot	17,710 476	84	27	22,500	St. Nazaire	1901	1903	2,000,824	10-8	8½	2½	8½	..	12	8½	2	12-pr., 8 3-pr., 2 1-pr., 4 12-in., 12 9-4-in., 16 12-pr., 8 6-4-in., 4 3-9-in., 16 1-8-in., 6 1-4-in.	2	19-0	960 681
a.c.	DupetitThouars	9367 452½	63½	24½	22,000	Toulon	1901	1905	831,839	6	2	3½	6	H.S.	6	6	2	2 7-6-in., 8 6-4-in., 4 3-9-in., 16 1-8-in., 6 1-4-in.	2	22-5	1020 610
a.c.	Dupleix	shd. 7578 426½	58½	24½	17,100	Rocheport	1900	1903	652,354	4-3	2½	..	..	..	3½	..	2	8 6-4-in., 4 3-9-in., 10 1-8-in., 4 1-4-in.	2	21-0	880 531
a.c.	Dupuy de Lôme	6676 374	51½	26½	14,000	Brest	1890	1893	416,000	4	2	4	..	..	4	4	2	2 7-6-in., 6 6-4-in., 12 2-5-in., and 1-8-in., 8 m.	2	20-0	900 515
a.c.	Edgard Quinet	43,780 515	70½	27½	36,000	Brest	1907	..	1,307,536	6½-3½	2½-1½	5-2	4½	8	8	4½	2	14 7-6-in., 16 2-4-in., 8 1-4-in., 2 smaller.	2	23-0	1242 738
a.c.	Ernest Renan	13,427 515	70½	26½	37,780	St. Nazaire	1906	1908	1,410,000	6½-4	2	5-3	4½	6	6	5	2	4 7-6-in., 16 6-4-in., 16 9-pr., 8 3-pr.	2	24-2	1354 674
t.	Gaulois	11,105 385½	66½	27½	14,500	Brest	1896	1898	1,093,925	15½	3½-1½	3	..	15½	3	3	2	4 12-in., 10 5-5-in., 8 3-9-in., 16 1-8-in., 10 1-4-in., 8 m.	2	18-0	680 632
a.c.	Gloire	9856 453	63½	24½	20,500	Lorient	1900	1904	883,269	6-4	2	5-2	..	7½	6½	5	2	5 2 7-6-in., 8 6-4-in., 6 3-9-in., 16 1-8-in., 6 1-4-in., 8 m.	2	21-0	970 615
a.c.	Gueydon (Amiral)	9367 459	63½	24½	20,200	Lorient	1899	1902	817,994	6-3½	2	3½	6	H.S.	6	3½	2	2 7-6-in., 8 6-4-in., 4 3-9-in., 16 1-8-in., 6 1-4-in.	2	21-0	1020 610
t.	Henri IV.	8807 354½	72	28	11,500	Charbourg	1899	1903	801,248	11-7	3	4½	..	11½	5	2	2 10-8-in., 7 5-5-in., 12 1-8-in., 2 m.	2	17-2	735 464	
t. & b.	Hoche	10,581 333	65½	27½	11,300	Lorient	1896	1899	700,000	18-14	3	3	..	16	H.S.	2	2 13-4-in., 2 10-8-in., 12 5-5-in., 4 2-5-in., 9 1-8-in., 12 1-4-in., 8 m.	5	16-0	800 660	
t.	Indomptable	7105 279½	59	23½	6605	Lorient	1893	1886	..	19½	3	3	..	10	H.S.	..	2 10-8-in., 6 3-9-in., 10 1-8-in., 4 1-4-in., 2 m.	2	14-8	400 332	
t.	Jauréguiberry	11,637 364	72½	27½	15,800	La Seyne	1902	1893	1,069,536	17½	2½	4	..	14½	4	2	2 12-in., 2 10-8-in., 8 5-5-in., 4 2-5-in., 12 1-8-in., 8 1-4-in., 8 m.	2	18-07	700 625	
a.c.	Jeanne d'Arc	11,092 477½	63½	26½	28,000	Toulon	1899	1903	875,847	6-3	2-2	3	..	6	5	2	2 7-6-in., 14 5-5-in., 16 1-8-in., 8 1-4-in., 2 m.	2	21-7	1400 626	

c.d.a.	Jemmapes	6474 284	57½	22	9250 D'A.	St. Nazaire	1892 1894	525,000	17½-10	4-2½	..	..	17½	..	2 13-4-in., 4 3-9-in., 4 1-8-in., 10 1-4-in., M.	2	16-7	300	834
a.c.	Jules Ferry	12,351 480½	70½	27	28,753 Guyot	Cherbourg	1903 1906	1,169,940	6½-4	2	5-3	6	6	5	4 7-6-in., 16 6-4-in., 22 1-8-in., 2 1-4-in.	2	22-8	1320	728
a.c.	Jules Michelet.	12,370 480½	70½	27	27,700 Guyot	Lorient	1905 1908	1,204,107	6-4	2	5-3	6	8	5	4 7-6-in., 12 6-4-in., 24 1-8-in., 2 1-4-in.	2	23-2	1320	734
t.	Justice	14,635 433½	79½	27½	18,548 Nic. t.	La Seyne	1904 1907	1,670,385	11-7	2½	8	..	12	6	4 12-in., 10 7-6-in., 26 1-8-in., 2 1-4-in.	2	19-43	905	793
a.c.	Kléber	shd. 7578 426½	58½	24½	18,000 Nic.	Bordeaux	1902 1903	770,320	4-3	2½	..	..	3½	..	8 6-4-in., 4 3-9-in., 10 1-8-in., 4 1-4-in.	2	21-2	880	581
a.c.	Latouche - Tréville	4631 348	46	19½	8300 B.	Havre	1892 1893	360,000	3½-2½	2	3½	..	3½	3½	2 7-6-in., 6 5-5-in., 4 2-5-in., 4 1-8-in., 6 1-4-in., M.	4	18-2	406	375
a.c.	Léon Gambetta	12,351 480½	70½	27	27,500 Nic.	Brest	1901 1904	1,169,940	6½-4	2	5-3	6	8	5	4 7-6-in., 16 6-4-in., 22 1-8-in., 2 1-4-in.	2	23-06	1320	728
t.	Liberté	14,635 434½	79½	27½	20,565 B. t.	St. Nazaire	1905 1907	1,652,436	11	..	8	..	12	6	4 12-in., 10 7-6-in., 26 1-8-in., 2 1-4-in.	2	19-31	905	793
a.c.	Marseillaise	9856 453	63½	24½	20,500 B.	Brest	1900 1903	881,270	6-4	2	5-2	..	7½	6½-5	2 7-6-in., 8 6-4-in., 6 3-9-in., 2 2-5-in., 18 1-8-in., 6 1-4-in.	2	21-0	970	615
t.	Masséna	11,735 384½	66	27	13,500 D'A.	St. Nazaire	1895 1898	1,100,400	17½-9½	3½	4	16	15½ 15½	4	2 12-in., 2 10-8-in., 8 5-5-in., 8 3-9-in., 12 1-8-in., 12 1-4-in.	2	17-1	630	642
t.	Mirabeau	17,710 476	84	27	22,500 tur.	Lorient	Badg. ..	1,803,224	10-8	2½	8½	..	12	8½	4 12-in., 12 9-4-in., 16 12-pr., 8 3-pr., 2 1-pr.	2	19-0	960	681
a.c.	Montcalm.	9367 452½	63½	24½	19,600 N.S.	La Seyne	1900 1902	902,809	6	2	3½	6	6	2½	2 7-6-in., 3 6-4-in., 4 3-9-in., 16 1-8-in., 6 1-4-in.	2	21-0	1020	612
t.	Patrie	14,635 433½	79½	27½	17,839 t Nic.	La Seyne	1903 1906	1,674,870	11-7	2½	8	..	12	6	4 12-in., 18 6-4-in., 26 1-8-in., 2 1-4-in.	2	19-12	905	793
a.c.	Pothuan	5374 370½	50½	21	10,898 B.	Havre	1895 1896	384,000	3½-2	3½	2½	..	9½	5½	2 7-6-in., 10 5-5-in., 16 1-8-in., 8 1-4-in.	4	19-2	538	461
t.	République	14,635 433½	79½	27½	19,626 t Nic.	Brest	1902 1906	1,523,136	11-7	2½	8	..	12	6	4 12-in., 18 6-4-in., 26 1-8-in., 2 1-4-in.	2	19-15	905	793

FRANCE.—Armoured Ships—continued.

Class.	NAME.	Displacement.	Length.	Beam.	Draft.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above belt.	Bulkhead.	Heavy Guns.	Gun Position.	Torpedo Tubes.				
b.	Requin	7078 tons.	273 ft.	59 ft.	24 ft.	7000 Nic.	Bordeaux	1885 1888 1902	..	£	in. 19½ comp.	in. 3	in. ..	in. ..	10 H.S.	in. ..	2 10-8-in., 6 3-9-in., 10 1-8-in., 4 1-4-in., 12 m.	4	kts. 15-0	4000 tons.	332
t.	Saint Louis	11,090 tons.	385 ft.	66 ft.	27 ft.	14,500 B.	Lorient	1896 1900 1,080,997	..	£	in. 15½ H.S.	3½	3 H.S.	..	3-15½ H.S.	3	4 12-in., 10 5-5-in., 8 3-9-in., 16 1-8-in., 10 1-4-in., 8 m.	2 (sub.)	18-0	820 tons.	631
t.	Suffren	12,527 tons.	411 ft.	70 ft.	27 ft.	16,500 Nic.	Brest	1899 1903 1,195,564	..	£	in. 12-8 H.S.	2½	5-3 H.S.	..	12 H.S.	6 5 4 12-in., 10 6-4-in., 8 3-9-in., 20 1-8-in., 2 1-4-in.	2 (sub.)	18-0	1100 tons.	615	
t.	Tréhouart	6671 tons.	293 ft.	58 ft.	23 ft.	8500 B.	Lorient	1893 1896 593,100	..	£	in. 17½ H.S.	4	14½	..	2 12-in., 8 3-9-in., 4 1-8-in., 4 1-4-in., 8 m.	2	15-76	300 tons.	337
c.d.s.	Valmy	6477 tons.	293 ft.	57 ft.	23 ft.	8954	St. Nazaire	1892 1895 578,957	..	£	in. 17½ H.S.	4	17½	..	2 13-4-in., 4 3-9-in., 4 1-8-in., 10 m.	2	16-7	300 tons.	297
t.	Vergniaud	17,710 tons.	476 ft.	84 ft.	27 ft.	22,500 tur.	Bordeaux	..	..	£	in. 10-8 K.S.	2½	8½	..	12 K.S.	8½ 4 12-in., 12 9-4-in., 16 12-pr., 8 3-pr., 2 1-pr.	2 (sub.)	19-0	900 tons.	681
t.	Vérité	14,635 tons.	433 ft.	79 ft.	27 ft.	20,433 t B.	Bordeaux	1907 1908 1,651,409	..	£	in. 11-7 H.S.	2½	8	..	12 H.S.	6 4 12-in., 10 7-6-in., 26 1-8-in., 2 1-4-in.	2 (sub.)	19-26	905 tons.	822	
a.s.	Victor Hugo	12,351 tons.	480 ft.	70 ft.	27 ft.	28,486 t B.	Lorient	1901 1907 1,229,932	..	£	in. 6½-4 H.S.	2	5-3 H.S.	6	8 H.S.	5 4 7-6-in., 16 6-4-in., 22 1-8-in., 2 1-4-in.	2 (sub.)	22-5	1320 tons.	728	
t.	Voltaire	7,710 tons.	476 ft.	84 ft.	27 ft.	22,500 tur.	La Seyne	1909 ..	..	£	in. 10-8 K.S.	2½	8½	..	12 K.S.	8½ 4 12-in., 12 9-4-in., 16 12-pr., 8 3-pr., 2 1-pr.	2 (sub.)	19-0	960 tons.	681
a.o.	Waldeck-Rousseau	13,780 tons.	515 ft.	70 ft.	27 ft.	36,000 Nic.	Lorient	1908 ..	..	£	in. 6½-4 K.S.	2½	5	4½	6	5½ 14 7-6-in., 16 2-4-in., 8 3-pr., 2 1-pr.	2 (sub.)	23-0	1242 tons.	738

FRANCE.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draft.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
3rd cl. cr.	Alger	tons. 4313	ft. 346	ft. 45½	ft. 19½	8254 B.	Cherbourg	1889	1893	£ 280,000	in. 3½	in. ..	4 6·4-in., 6 5·5-in., smaller, 10 m.	5	knots. 19·61 f	tons. 860	325
Co. g. b.	Casabianca	974	262½	26½	11½	5200 D'A.	Bordeaux	1895	1896	98,985	½	..	1 3·9-in., 3 2·5-in., 5 1·8-in., 4 1·4-in.	2	22·0	116	143
3rd cl. cr.	Cassard	3890	325½	45	20½	10,143 D'A.	Cherbourg	1896	1898	318,712	3	2	6 6·4-in., 4 3·9-in., 10 1·8-in., 3 1·4-in., 2 m.	2	19·8 f	630	385
Co. g. b.	Cassini	966	262½	27½	11½	5500 D'A.	Bordeaux	1894	1894	98,500	½	..	1 3·9-in., 3 2·5-in., 4 1·4-in.	2	21·2 f	110	118
3rd cl. cr.	Catinat	4048	331½	44½	21	9000 B.	Havre	1896	1897	324,992	3	2	4 6·4-in., 10 3·9-in., 10 1·8-in., 4 1·4-in. m.	2	19·0	563	384
3rd cl. cr.	Chasseloup-Laubat	3824	308½	43½	20½	9000 D'A.	Cherbourg	1893	1894	256,320	3	..	6 6·4-in., 4 3·9-in., 8 1·8-in., 12 1·4-in. m.	2	19·25 f	587	358
2nd cl. cr.	Châteaurenault	7898	442½	55½	24½	24,300 t N.S.	La Seyne	1898	1902	606,656	2½	2	2 6·4-in., 6 5·5-in., 10 1·8-in.	2	24·19 f	1400 2100	625
3rd cl. cr.	Cosmao	1923	312	30½	14	6000	Bordeaux	1888	1890	133,000	1½	..	4 5·5-in., 8 other Q.F., 4 m.	4	20·5 f	200	190
3rd cl. cr.	D'Assas	3962	325½	45	20½	9500 D'A.	St. Nazaire	1896	1898	292,682	3	2	6 6·4-in., 4 3·9-in., 10 1·8-in., 11 1·4-in.	2	19·25 f	630	393
3rd cl. cr.	Davout	3031	295½	40	17½	9000 Nic.	Toulon	1890	1902	221,827	3	..	6 6·4-in., 4 3·9-in., 4 2·5-in., 4 1·8-in., 6 m.	4	20·07 f	600	336
g. v.	Décidée	635	184½	26½	12½	1000 Nic.	Lorient	1899	1900	54,100	..	..	2 3·9-in., 4 2·5-in., 4 1·4-in.	..	13·0	99	99
2nd cl. cr.	D'Entrecasteaux	7995	383½	58½	25½	13,500	La Seyne	1896	1898	667,740	4	10-3 H.S.	2 9·4-in., 12 5·5-in., 12 1·8-in.	2	19·2 f	650	521

FRANCE.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.	Armament.	Speed.	Coal.	Complement.	
		tons.	ft.	ft.	ft.					£	Deck.	Gun Position	Guns.	Torpedo Tubes.	knots.	tons.
3rd cl. <i>cr.</i>	Descartes	. shd. 3970	326	42½	21½	9000 B.	St. Nazaire	1894	1896	334,725	1½	in.	4 6.4-in., 10 3.7-in., 8 1.8-in., 4 1.4-in.	2	21.0	552
3rd cl. <i>cr.</i>	D'Estrées	. shd. 2421	311½	39½	17½	8500 Nor.	Rocheport	1897	1900	208,200	1½	..	2 5.5-in., 4 3.9-in., 8 1.8-in., 2 1.4-in.	..	20.5	345 480
<i>to. g. b.</i>	D'Iberville	. . 952	262½	27	11½	5000 D'A.	St. Nazaire	1893	1894	99,120	½	..	1 3.9-in., 1 2.5-in., 4 1.4-in.	6	21.4	117
3rd cl. <i>cr.</i>	Du Chayla	. shd. 3890	325½	45	20½	10,009 D'A.	Cherbourg	1895	1897	315,835	3	2 shield	6 6.4-in., 4 3.9-in., 10 1.8-in., 3 1.4-in., 2 M.	2	20.2	624
<i>to. g. b.</i>	Dunois	. . 889	256	27½	12½	7000 N.S.	Cherbourg	1897	1898	123,383	..	..	6 2.5-in., 6 1.8-in.	..	23.0	137
<i>to. cr.</i>	Epervier	. . 1268	216½	29½	15½	3200	Rocheport	1885	1887	80,000	1½	..	5 3.9-in., 1 2.5-in., 6 M.	4	17.6	160
<i>to. cr.</i>	Faucon	. . 1311	216½	29½	15½	3200	Toulon	1887	1888	80,000	1½	..	5 3.9-in., 1 2.5-in., 6 M.	4	18.0	150
3rd cl. <i>cr.</i>	Forbin	. . 1435	312	30½	16	5700	Rocheport	1898	1890	123,739	1½	..	4 5.5-in., 8 other Q.F., 4 M.	4	20.6	200
T.D.S.	Foudre	. . 5984	370½	52½	23½	11,900 D'A.	Bordeaux	1895	1897	407,712	3½	..	8 3.9-in., 4 2.5-in., 4 1.4-in.	4	19.9	840
3rd cl. <i>cr.</i>	Friant	. . 3882	308½	43½	20½	9000 Nic.	Brest	1893	1894	308,750	3	..	6 6.4-in., 4 3.9-in., 8 1.8-in., 6 1.4-in.	2	18.19	587
3rd cl. <i>cr.</i>	Gallée	. . 2318	330½	34½	17½	6600 B.	Rocheport	1896	1897	208,152	1½	2 shield	4 5.5-in., 2 3.9-in., 8 1.8-in., 8 1.4-in.	2	20.0	226
2nd cl. <i>cr.</i>	Guichen	. shd. 8151	436½	54½	24½	24,000 D'A.	St. Nazaire	1897	1902	611,945	2½	2 shield	2 6.4-in., 6 5.5-in., 10 1.8-in.	2	23.0	1460

3rd cl. <i>cr.</i>	Infernet .	shd.	2435	311½	39½	15½	8500 Nor.	Bordeaux	.	1899	1900	193,000	1½	..	2 5·5-in., 4 3·9-in., 8 1·8-in.	2	20·5	345 480	234
3rd cl. <i>cr.</i>	Isly .	.	4406	346	48½	19½	8100	Brest .	.	1891	1892	252,760	3	..	4 6·4-in., 6 5·5-in., 14 2·5-in. and 1·8-in., 8 m.	3	18·3	880	332
2nd cl. <i>cr.</i>	Jurien de la Gravière	shd.	5595	440	43½	22	17,000 Guyot	Lorient .	.	1899	1901	475,979	3	..	8 6·4-in., 12 1·8-in..	2	22·9 f	600 900	511
<i>g. v.</i>	Kersaint .	shd.	1223	226	34½	15	2200	Roche fort	.	1897	1898	107,993	..	..	1 5·5-in., 5 3·9-in., 7 1·4-in.	..	15·0	199	110
<i>to. g. b.</i>	La Hire .	.	889	256	27½	12½	7000 N.S.	Cherbourg	.	1898	1899	123,383	..	..	6 2·5-in., 6 1·8-in..	..	23·0	137	128
3rd cl. <i>cr.</i>	Lalande .	.	1968	311½	31½	14	6000	Bordeaux	.	1888	1900	133,800	1½	..	4 5·5-in., 8 other Q.R., 4 m.	4	22·0	200	190
3rd cl. <i>cr.</i>	Lavoisier .	.	2285	330½	34½	17½	6400 B.	Roche fort	.	1897	1899	202,024	1½	2 abfield	4 5·5-in., 2 3·9-in., 8 1·8-in., 2 1·4-in., 4 m.	2	20·0	226	248
3rd cl. <i>cr.</i>	Linols .	.	2308	321½	34½	17½	6600	La Seyne	.	1894	1895	163,014	1½	3·9 abfield	4 5·5-in., 2 3·9-in., 8 1·8-in., 4 1·4-in., 4 m.	4	20·5 f	200	248
3rd cl. <i>cr.</i>	Pascal .	.	3951	326	42½	21½	9000 f B.	Toulon .	.	1895	1897	322,321	1½	..	4 6·4-in., 10 3·9-in., 8 1·8-in., 4 1·4-in., m.	2	20·0 f	650	378
3rd cl. <i>cr.</i>	Protet .	shd.	4001	331½	44½	21	9300	Bordeaux	.	1898	1900	324,992	2½	2 abfield	4 6·4-in., 10 3·9-in., 10 1·8-in., 2 1·4-in.	2	20·2 f	563	384
3rd cl. <i>cr.</i>	Surcouf .	.	2012	312	30½	14	6000	Cherbourg	.	1888	1900	131,200	1½	..	4 5·5-in., 8 other Q.R., 4 m.	4	20·5 f	200	190
<i>g. v.</i>	Surprise .	.	617	184½	24½	12½	853 f	Harve .	.	1895	1896	50,954	..	..	2 3·9-in., 4 2·5-in., 4 1·4-in.	..	13·4 f	73	99
<i>g. v.</i>	Zélée .	.	554	185½	26	10½	1000 Nic.	Roche fort	.	1899	1900	..	..	..	2 3·9-in., 4 2·5-in., 4 1·4-in.	..	13·0	80	75

Gun vessel Fulton (899 tons); gunboats Comète, Lion. Shallow-draught gunboats Argus and Vigilante, launched at Chiswick 1900 :—displacement, 122 tons; 13 knots.

Merchant Cruisers (Auxiliary to French Navy).

To what Company belonging.	Name.	Register Tonnage.	Length.	Beam.	Depth.	Speed.	When built.
Compagnie Générale Transatlantique	La Provence	Tons, 15,000	Feet. —	Feet. —	Feet. —	Knots, 22	1905
	La Lorraine	11,869	563.1	60.0	35.9	20	1900
	La Savoie	11,200	563.1	60.0	35.9	20	1900
	L'Aquitaine	8810	500.0	57.3	34.0	19	1890
	La Touraine	9047	520.2	56.0	34.6	19	1890
	Duc de Bragance	2096	334.6	31.2	16.8	17½	1889
	Eugène Pereire	2078	334.6	35.1	23.9	17½	1888
	Général Chanzy	2299	341.2	35.7	15.5	17½	1891
	La Bretagne	7112	495.4	51.8	34.5	17½	1886
	La Champagne	7087	493.4	51.8	34.5	17½	1885
Messageries Maritimes	La Gascogne	7395	495.4	52.2	34.8	17½	1886
	Maréchal Bugeaud	2206	342.5	34.1	23.0	17½	1890
	Ville d'Alger	2211	342.7	36.1	23.0	17½	1890
	Armand Béhic	6535	486.6	50.1	36.8	17½	1892
	Australien	6570	482.3	49.2	34.1	17½	1889
	Polynésien	6569	482.3	49.2	34.1	17½	1890
	Ville de la Ciotat	6631	485.8	49.9	36.8	17½	1892
	Annam	6344	446.2	50.9	36.1	17½	1898
	Atlantique	6708	468.9	50.6	32.8	17½	1899
	Tonkin	6764	446.2	50.9	36.1	17½	1898

NOTE.—The armament for the larger ships is 7 5.5-in. and smaller quick-firers. Other vessels of less speed of the Compagnie Transatlantique and the Messageries Maritimes are in the list.

GERMANY.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Cost.	Armour.				Armament.		Speed.	Coal.	Complement.
										Belt.	Side Deck above Belt.	Bulkhead.	Gun Position.	Heavy Guns.	Second-ary.			
a. d. s.	Aegir . . .	4084 267	49½	17½	4800	Kiel . . .	1895 1897	233,500	£	in. 9½	in. 2	in. . .	in. 8½	in. . .	in. . .	4 14-8	225	276
c. d. s.	Beowulf . . .	4019 267	49½	17½	4800	Bremen . . .	1890 1893	175,000	£	in. 9½	in. 1½	in. . .	in. 8	in. . .	in. . .	4 15-0	580	297
b.	Beowulf (Ersatz)*	19,000	..	..	22,000	Bremen (Weeser)	1902	..	..	12-4	..	..	..	..	..	6 19-5	†	860
a. c.	Bliicher* . . .	14,760	..	..	35,000	Kiel . . .	1908	1,835,000	£	6	..	..	..	..	..	12 12-in., 12 6-7 in.	..	791
b.	Brandenburg . . .	9874 354½	65	24½	9640	Stettin (Vulcan)	1891 1893	606,500	£	15½	2½	..	11½	11½	11½	6 11-in., 8 4-1-in., 8 3-4-in., 12 1-4-in., 8 m., 21.	3 16-5	552
b.	Braunschweig . . .	12,997 398½	73½	24½	16,000	Germania . . .	1902 1904	1,157,500	£	9-4	3 6	6	10-6	6	10-6	4 11-in., 12 1-4-in., 8 m. (sub.)	6 18-0	660
b.	Deutschland . . .	13,040 398½	72½	24½	16,929	Germania . . .	1904 1906	1,214,000	£	9½-4	3 8	6	10-6	6	10-6	4 11-in., 4 1-4-in., 4 m. (sub.)	6 18-5	736
b.	Elsaass . . .	12,997 398½	72½	24½	16,812	Danzig . . .	1903 1905	1,157,500	£	9-4	3 6	6	10-6	6	10-6	4 11-in., 14 6-7-in., 12 6 18-7	800	660
a. c.	G* . . .	18,700	..	..	45,000	Hamburg . . .	1903	..	..	..	..	..	..	..	..	12 11-in.	25	..
a. c.	Friedrich Karl . . .	8858 336½	65½	24	18,500	Hamburg . . .	1902 1904	875,000	£	4	2 6	4	6	4	4	4 8-2-in., 10 5-9-in., 12 3-4-in., 14 1-4-in., 4 m. (sub.)	20-5	504
c. d. s.	Frithjof . . .	4049 267	49½	17½	4800	Bremen . . .	1891 1892	175,000	£	9½	1½	..	7½	7½	7½	4 3-9-4-in., 8 3-4-in., 6 m.	4 14-8	276
a. c.	Fürst Bismarck . . .	10,570 393½	66½	26	14,000	Kiel . . .	1897 1900	..	..	7½	3	..	7½	7½	7½	4 9-4-in., 12 5-9-in., 10 6 19-0	1000†	565
a. c.	Gneisenau . . .	11,420 449½	70½	24½	26,000	Bremen (Weeser)	1906 1908	..	..	6-3	2 6-4½	..	6½	6½	6½	8 8-2-in., 6 5-9-in., 20 4 23-8	800†	650
c. d. s.	Hagen . . .	4019 267	49½	17½	5220	Kiel . . .	1893 1895	..	..	7	1½	..	7½	7½	7½	3-9-4-in., 10 3-4-in., 7 m.	4 15-0	297
b.	Hannover . . .	13,040 398½	73½	25½	22,492	Wilhelms-haven	1905 1907	1,157,500	£	9½-4	3 8	6	10-6	6	10-6	4 11-in., 14 6-7-in., 20 6 19-16	700	736
c. d. s.	Heimdal . . .	4049 267	49½	17½	4893	Wilhelms-haven	1892 1893	233,500	£	7	1½	..	7½	7½	7½	3-9-4-in., 10 3-4-in., 7 m.	4 15-0	297
b.	Hessen . . .	12,997 398½	73½	24½	16,000	Kiel (Germania)	1903 1905	1,157,500	£	9-4	3 6	6	10-6	6	10-6	4 11-in., 14 6-7-in., 12 6 18-0	800	660

* Particulars doubtful.

† Also liquid fuel.

‡ And 200 tons "tar oil."

§ Exclusive of armament.

GERMANY.—Armoured Ships—continued.

Class	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck above Belt.	Slide above Belt.	Bulkhead.	Heavy Guns.	Gun Position.	Guns.	Torpedo Tubes.			
a. d. s.	Hildebrand .	tons. 4049	267	49½	17½	4413 T.S.	Kiel.	1892	1893	£ 218,000	in. 7	1½	in. ..	in. ..	in. 7½	in. ..	3 9-4-in., 10 3-4-in., 7 M.	4	kts. 15-0	tons. 580½	297
b.	Kaiser Barbarossa.					13,000 C. & T.	Danzig	1900	1901	962,500	K. S.	3	..	..	H. S.	..	4 9-4-in., 14 5-9-in., 12 3-4-in., 12 1-4-in., 8 M.	4	16-0	650	700
b.	Kaiser Friedrich III.					13,000 C. & T.	Wilhelms-haven	1896	1898	H. N. S.	H. N. S.	..	..	..	9½	6	H. N. S. H. N. S.	(sub.)	1050½		
b.	Kaiser Wilhelm II.					13,000 C. & T. S.	Wilhelms-haven	1897	1900	962,500	11½	3	..	..	9½	6	4 9-4-in., 18 5-9-in., 12 3-4-in., 12 1-4-in., 8 M.	6	18-0	650	700
b.	Kaiser Wilhelm der Grosse.					13,000 C. & T. S.	Germania.	1899	1901	H. N. S.	H. N. S.	..	..	..	H. N. S.	H. N. S.	..	(sub.)	1050½		
b.	Kaiser Karl der Grosse					13,000 C. & T. S.	Hamburg. (Blöhm & Voss)	1899	1901	H. N. S.	H. N. S.	..	..	..	11½	1½	6 11-in., 8 4-1-in., 8 3-4-in., 12 1-4-in., 8 M., 2 1.	3	16-0	680	550
b.	Kurfürst Friedrich Wilhelm.					9359	Wilhelms-haven	1891	1893	653,000†	15½	2½	..	..	comp.	6	4 11-in., 14 6-7-in., 12 3-4-in., 12 1-4-in., 8 M.	6	18-54	800	600
b.	Lothringen .					16,950 W. T. & C.	Schichau (Danzig)	1901	1906	1,157,500	9-4	3	6	6	10-6	6	4 9-4-in., 18 5-9-in., 12 3-4-in., 12 1-4-in., 8 M.	6	18-1	1000½	715
b.	Mecklenburg .					14,000 C. T. & S.	Stettin (Vulcan)	1901	1903	1,061,250	9-4	3	3½	6	10	6	4 9-4-in., 18 5-9-in., 12 3-4-in., 12 1-4-in., 8 M.	6	19-0	1450½	860
b.	Nassau* .					25,000 tur.	Wilhelms-haven	1908	..	1,825,000	12-4	..	..	..	11	..	12 11-in., 12 6-7-in., 31 smaller and M.	6	19-0	..	..
c. d. s. b.	Odin .					4800 T. S.	Danzig	1894	1896	..	9½	2	..	..	8½	..	3 9-4-in., 10 3-4-in., 6 M.	4	15-0	225½	266
b.	Oldenburg .					3900	Stettin	1884	1887	235,342	12	1	..	..	8	..	8 9-4-in., 2 3-4-in., 6 M.	4	13-5	475	356
b.	Oldenburg(Ersatz)*.					22,000	Wilhelms-haven	1905	..	..	12-4	..	..	..	comp.	..	12 12-in., 12 6-7 in.	6	19-5	..	860
b.	Pommern .					20,400 T. S. t.	Stettin (Vulcan)	1905	1907	1,214,000	9½-4	3	8	6	10-6	6½	4 11-in., 14 6-7-in., 20 3-4-in., 4 1-4-in., 4 M.	6	19-21	700	736
b.	Posen .					25,000	Germania .	1908	..	1,825,000	12-4	..	..	..	11	..	12 11-in., 12 6-7 in., 31 smaller and M.	6	19-5	1800½	860

b.	Preussen.	12,997,389½	79½	24½	18,374	Stettin	1903	1905	1,157,500	9-4	3	6	6	10-6	6	4	11-in., 14 16-7-in., 12 3-4-in., 12 1-4-in. & 8 M. (sub.)	18-6	800	650
a. a.	Prinz Adalbert	8858,303½	65½	24	18,500	Kiel.	1901	1903	885,000	4	1½	3	3	6	4	8	3-4-in., 10 5-9-in., 12 4-4-in., 14 1-4-in., 4 M. (sub.)	20 3	1500	504
a. a.	Prinz Heinrich	8759,396	64½	24½	15,000	Kiel	1900	1902	730,000	4	2½	4	..	6	4	2	9-4-in., 10 5-9-in., 10 4-4-in., 12 1-4-in., 4 M. (sub.)	20-0	950	528
b.	Rheinland *	18,307,472	82½	26	25,000	Stettin (Vulcan)	1908	..	1,825,000	12-4	..	..	..	11	..	12	11-in., 12 6-7-in., 31 smaller and M.	19-5	..	860
a. a.	Roon	9350,403½	65½	24	20,625	Kiel.	1903	1905	875,000	4-3	2½	6	4	6	4	8	2-4-in., 10 5-9-in., 16 3-4-in., 10 1-4-in., 4 M. (sub.)	21-17	750	50
a. a.	Scharnhorst	11,420,449½	70½	24½	26,000	Hamburg.	1906	1908	..	6-3	2	6-4½	..	6½	..	8	8-2-in., 6 5-9-in., 20 3-4-in., 14 smaller	22-5	800½	650
b.	Schlesien	13,040,398½	72½	25½	16,939	(Schichau) (Germania)	1906	1908	1,214,000	9½-4	3	8	6	11-6	6½	4	11-in., 14 6-7-in., 20 3-4-in., 4 1-4, 4 M.	19-2	700	736
b.	Schleswig-Holstein	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	19-5	1800½	..
b.	Schwaben	11,643,393½	68½	24½	14,000	Wilhelms- haven	1901	1903	1,061,250	9-4	3	5½	6	10-6	6	4	9-4-in., 18 5-9-in., 12 3-4-in., 12 1-4-in., 8 M. (sub.)	18-0	700	715
b.	Stieglfried (Eratz) *	18,000	..	..	22,000	Kiel	1899	..	..	12-4	..	..	..	..	..	..	12 12-in., 12 6-7-in.	19-5	1450	860
a. a.	Von der Tann *	19,000,760	85	27	45,000	(Howaldt) Hamburg	1909	..	1,833,000	8	..	..	..	..	..	..	12 11-in.	25-0	..	..
b.	Weissenburg	9874,554½	65	24½	9000	Stettin (Vulcan)	1891	1893	659,475½	15½	2½	..	..	11½	1½	6	11-in., 8 4-1-in., 8 3-4-in., 12 1-4-in., 8 M., 2 1-4-in.	16-0	680	552
b.	Westfalen *	17,679,472	82½	26	25,000	Bremen (Weser)	1908	..	1,825,000	12-4	..	..	..	11	..	12	11-in., 12 6-7-in., 31 smaller and M.	19-0	800	860
b.	Wettin	11,643,393½	68½	24½	14,000	(Schichau) Wilhelms- haven	1901	1902	1,071,250	9-4	3	5½	6	10	6	4	9-4-in., 18 5-9-in., 12 3-4-in., 12 1-4-in., 8 M. (sub.)	18-0	700	715
b.	Wittelsbach	..	..	..	..	..	1900	1902	1,071,250	..	..	..	..	..	..	..	..	1450	1450	..
b.	Wörth	9874,554½	65	24½	10,224	Kiel.	1892	1894	595,250½	15½	2½	..	..	11½	1½	6	11-in., 8 4-1-in., 8 3-4-in., 12 1-4-in., 8 M., 2 1-4-in.	17-2	680	552
a. a.	Yorok	9350,403½	65½	24	19,183	Hamburg	1904	1905	875,000	4-3	2	6	4	6	4	8	2-4-in., 10 5-9-in., 16 3-4-in., 10 1-4-in., 4 M. (sub.)	21-1	750	550
b.	Zähringen	11,643,393½	68½	24½	15,000	Germania.	1901	1902	1,071,250	9-4	3	5½	6	10	6	4	9-4-in., 18 5-9-in., 12 3-4-in., 12 1-4-in., 8 M. (sub.)	19-0	1600	715

Also liquid fuel.

The programme for 1909 includes 3 battleships to replace the Frithjof, Heimdall and Hildebrand; and the cruiser-battleship II.

GERMANY.—Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draft.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
3rd cl. <i>cr.</i>	<i>Amazona</i>	2618 tons.	328 ft.	38½ ft.	16 ft.	8000 T.S.	Kiel (Germania)	1900	1901	247,000 £	2	in.	10 4-1-in., 4 M., 2 L.	14 1-4-in., 2 (sub.)	21½ knots.	560 tons.	249
"	<i>Arcona</i>	2657	328	38½	16	8000 T.S.	Bremen (Weser)	1902	1903	254,500	2	..	10 4-1-in., 4 M., 2 L.	12 1-4-in., 2 (sub.)	21-0	700	249
"	<i>Ariadne</i>	2618	328	38½	16	8000 T.S.	Bremen (Weser)	1900	1901	247,000	2	..	10 4-1-in., 4 M., 2 L.	14 1-4-in., 2 (sub.)	22-0	560	249
"	<i>Berlin</i>	3200	341	43½	16½	11,000 T.S.	Danzig	1903	1904	254,500	2	..	10 4-1-in., 4 M., 2 L.	10 1-4-in., 2 (sub.)	23-2	800	286
"	<i>Bremen</i>	3200	341	43½	16½	10,000 T.S.	Bremen (Weser)	1903	1904	254,500	2	..	10 4-1-in., 4 M., 2 L.	10 1-4-in., 2 (sub.)	23-0	800	286
"	<i>Bussard</i> *	1555	256	30½	18½	2900 T.S.	Danzig	1890	1890	..	3	..	8 4-1-in., 7 M.	..	16-5	300	165
<i>to. g. b.</i>	<i>Comet</i>	971	262½	31½	13½	5000	Stettin (Vulcan)	1892	1896	..	2	..	4 3-4-in., 2 M.	..	21-0	120	115
3rd cl. <i>cr.</i>	<i>Condor</i>	1614	246	33½	15	2930	Hamburg	1892	1892	..	3	..	8 4-1-in., 7 M.	..	16-5	300	165
3rd cl. <i>cr.</i>	<i>Cormoran</i>	1614	246	33½	15	2930	Danzig	1892	1893	..	3	..	8 4-1-in., 7 M.	..	16-0	300	165
3rd cl. <i>cr.</i>	<i>Danzig</i>	3200	341	43½	16½	10,000 T.S.	Danzig	1905	1906	254,500	2	..	10 4-1-in., 4 M., 2 L.	10 1-4-in., 2 (sub.)	23-0	800	286
3rd cl. <i>cr.</i>	<i>Dresden</i>	3514	364	44½	15½	15,000 (tur.)	Hamburg	1907	1908	..	..	..	10 4-2-in., 12 smaller and M.	..	24-5	900	..
<i>g. b.</i>	<i>Eber</i>	977	200½	30½	10½	1300 T.S.	Danzig	1903	1904	91,000	..	..	8 3-4-in., 6 1-4-in., 2 M.	..	13-0	240	121
3rd cl. <i>cr.</i>	<i>Emden</i>	3514	364	44½	15½	15,000 (tur.)	Danzig	1908	1909	..	..	..	10 4-2-in., 12 smaller and M.	2	24-5	900	..
3rd cl. <i>cr.</i>	<i>Falke</i> *	1555	246	33½	15	2900 T.S.	Kiel	1891	1892	..	3	..	8 4-1-in., 7 M.	..	15-5	300	165
3rd cl. <i>cr.</i>	<i>Frauenlob</i>	2657	328	38½	16	8000 T.S.	Bremen (Weser)	1902	1904	254,500	2	..	10 4-1-in., 4 M., 2 L.	12 1-4-in., 2 (sub.)	21-0	700	249
2nd cl. <i>cr.</i>	<i>Freya</i>	5569	344½	57	20½	10,000 Nic.	Danzig	1897	1898	..	4	4	2 8-2-in., 6 6-in., 10 3-4-in., 10 1-4-in., 4 M.	3 (sub.)	19-5	825	465
3rd cl. <i>cr.</i>	<i>Gazelle</i>	2603	328	38½	16½	6100 Nic.	Kiel (Germania)	1898	1898	225,000	2	..	10 4-1-in., 4 M., 2 L.	2 (sub.)	18-0	560	210

3rd cl. cr.	Geflon	.	.	3705	344½	42½	20½	9000	Danzig (Schichau)	1893	1894	..	1½	..	10 4-1-in., 6 2-1-in., 1 l. 8 m.	2	19-0	780	302
"	Geier	.	shd.	1597	249½	34½	15½	2960	Wilhelmshaven	1894	1896	..	3	..	8 4-1-in., 7 m.	2	16-2	300	165
"	Hamburg	.	shd.	3200	341	43½	16½	11,500	Stettin (Vulcan)	1903	1904	254,500	2	..	10 4-1-in., 10 1-4-in., 4 m., 2 l.	2	23-28	800	249
2nd cl. cr.	Hansa	.	shd.	5791	345½	57½	21½	10,000	Stettin (Vulcan)	1898	1899	..	4	..	2 8-2-in., 8 6-in., 10 3-4-in., 10 1-4-in., 4 m.	3	19-5	825	465
d. r.	Hela	.	.	2004	328	36	14½	5860	Bremen (Weser)	1895	1896	..	1½	..	4 3-4-in., 6 1-9-in., 2 m.	3	20-0	500	178
2nd cl. cr.	Hertha	.	.	5569	344½	57	21½	10,000	Stettin (Vulcan)	1897	1898	..	4	..	2 8-2-in., 8 6-in., 10 3-4-in., 10 1-4-in., 4 m.	3	19-5	825	405
g. b.	Ilitis	.	shd.	881	203½	29½	10½	1300	Danzig (Schichau)	1898	1898	100,000	..	..	8 3-4-in., 6 1-4-in., 2 m.	..	13-5	165	121
3rd cl. cr.	Irene	.	shd.	4224	308	46	21	8000	Stettin (Vulcan)	1887	1888	220,000	3	..	4 5-9-in., 8 4-1-in., 6 1-9-in., 1 l., 8 m.	3	19-8	540	365
g. b.	Jaguar	.	shd.	900	203½	29½	10½	1300	Danzig (Schichau)	1898	1899	90,000	..	..	8 3-4-in., 6 1-4-in., 2 m.	..	13-5	165	121
2nd cl. cr.	Kaiserin Augusta	shd.	5556	387	52½	52½	23	14,000	Kiel (Hermannia)	1892	1896	..	3½	..	12 5-9-in., 8 3-4-in., 2 l., 8 m.	3	21-0	850	436
3rd cl. cr.	Kolberg	.	.	4232	388½	46	..	20,000	Danzig (Schichau)	1908	..	..	2	..	12 4-1-in., 4 2-2-in.	2	25-5	..	..
"	Königsberg	.	.	3550	354½	43½	..	13,200	Kiel	1906	1907	..	..	..	10 4-1-in., 8 2-2-in., 4 m.	2	23-5	400	295
"	Leipzig	.	.	3200	341	43½	16½	11,000	Bremen (Weser)	1905	1906	254,500	2	..	10 4-1-in., 10 1-4-in., 4 m., 2 l.	2	23-0	800	286
"	Lübeck	.	.	3200	341	43½	16½	14,000	Stettin (Vulcan)	1904	1906	254,500	2	..	10 4-1-in., 10 1-4-in., 4 m., 2 l.	2	23-0	800	286
g. b.	Luchs	.	.	962	206½	30½	10½	1300	Danzig	1899	1900	91,000	..	..	8 3-4-in., 6 1-4-in., 2 m.	..	13-5	240	121
3rd cl. cr.	Mainz	.	.	4232	388½	46	..	20,000	Stettin (Vulcan)	1909	..	..	2	..	12 4-1-in., 4 2-2-in.	2	25-5	..	..
"	Medusa	.	shd.	2618	328	38½	16	8000	Bremen (Weser)	1900	1901	247,000	2	..	10 4-1-in., 14 1-4-in., 4 m., 2 l.	2	22-0	560	249
"	München	.	shd.	3200	341	43½	16½	11,000	Bremen (Weser)	1904	1905	254,500	..	..	10 4-1-in., 10 1-4-in., 4 m., 2 l.	2	23-4	800	286
"	Niobe	.	shd.	2603	328	38½	15	8000	Bremen (Weser)	1899	1901	217,500	2	..	10 4-1-in., 14 1-4-in., 4 m., 2 l.	2	20-0	560	250
"	Nymphe	.	shd.	2618	328	38½	15	8000	Kiel (Hermannia)	1899	1901	217,500	..	..	10 4-1-in., 8 2-2-in., 4 m.	2	23-5	400	295
"	Nürnberg	.	.	3396	354½	43½	..	13,200	Kiel	1906	1908	..	..	..	8 3-4-in., 6 1-4-in., 2 m.	..	13-5	850	121
g. b.	Panther	.	.	962	206½	30½	10½	1300	Danzig	1901	1902	91,000	..	..	8 3-4-in., 6 1-4-in., 2 m.	..	13-5	240	121

* The programme for 1909 includes two third-class cruisers to replace the Buzzard and Falke.

GERMANY.—Cruising Ships—continued.

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Class.	NAME.	Displacement.	Length.	Beam.	Draft.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Armour.		Armament.		Speed.	Coal.	Complement.
										Deck.	Gun Position.	Guns.	Torpedo Tubes.			
cr.	Pelikan (mining ship) .	2215 tons.	259 ft.	38 ft.	14½ ft.	3000	Kiel . . .	1890	1891	in.	in.	4 3·4-in., 4 M.	..	15·4 kts.	370 tons.	183
3rd cl. cr.	Prinzess Wilhelm shd.	4224	339½	46	21	8000	Kiel (Germania) .	1887	1888	3	..	4 5·9-in., 8 4·1-in., 6 1·9-in., 1 L., 8 M.	3	18·7 ft.	540	365
3rd cl. cr.	Schwalbe (Ersatz) .	4281	..	..	..	(tur.)	Kiel (Germania) .	Bldg.	..	..	..	..	..	..	..	..
3rd cl. cr.	Seeadler . . .	1614	246	33½	15	2800	Hamburg . . .	1892	1892	3	..	8 4·1-in., 7 M.	2	16·0	300	165
3rd cl. cr.	Sperber (Ersatz) .	4281	..	..	..	(tur.)	Kiel . . .	Bldg.	..	..	..	..	..	..	..	..
3rd cl. cr.	Stettin . . .	3396	354½	43½	..	18,200 T.S. tur.	Stettin (Vulcan) .	1907	1907	..	..	10 4·1-in., 8 2·2-in., 4 M.	2 (sub.)	23·5	400	295
3rd cl. cr.	Stuttgart . . .	3396	354½	43½	..	13,200 T.S. tur.	Kiel . . .	1906	1908	..	..	10 4·1-in., 8 2·2-in., 4 M.	2 (sub.)	23·3	400	295
3rd cl. cr.	Thetis . . . shd.	2618	344½	38½	16	8000 T.S.	Danzig . . .	1900	1901	2	..	10 4·1-in., 14 1·4-in., 4 M., 2 L.	2 (sub.)	21·8	560	249
g. b.	Tiger . . .	962	203½	29½	10	1300 T.S.	Danzig . . .	1899	1900	..	..	8 3·4-in., 6 1·4-in., 2 M.	..	13·5	240	121
3rd cl. cr.	Undine . . . shd.	2657	328	38½	15	8000 T.S.	Kiel (Howaldt) .	1902	1904	2	..	10 4·1-in., 12 1·4-in., 4 M., 2 L.	2 (sub.)	21·0	700	249
2nd cl. cr.	Victoria Luise . .	5569	341½	57	21½	10,000 Durr.	Bremen (Weser) .	1897	1898	4	4	2 8·2-in., 8 6-in., 10 3·4-in., 10 1·4-in., 4 M.	3 (sub.)	19·5	825	465
"	Vineta . . . shd.	5791	345½	57½	21½	10,000 Durr.	Danzig . . .	1897	1899	4	4	2 8·2-in., 8 6-in., 10 3·4-in., 10 1·4-in., 4 M.	3 (sub.)	19·5	825	465

The Imperial Yacht Hohenzollern, 4187 tons, 9460 I.H.P., 22 knots, carries 8 1·9-in. Q.F., but provision is made for mounting 3 4·1-in., 12 1·9-in. Q.F. and 4 M. River gunboats for China, the Taiguan, Vaterland and Vorwärts (168 tons); C completing at Tecklenburg. The mining vessels Nautilus and Albatross, built at Bremen, launched 1896 and 1897 (2000 tons). Gunnersy tender Drache, 765 tons, 15 knots, built at the Germania yard, 1908. Submarine salvage vessel Vulkan, built 1908.

Merchant Cruisers (Auxiliaries to the German Navy).

To what Company belonging.	Name of Ship.	Register Tonnage.	Length.		Beam.		Draught of Water.		Indicated H.P.	Ocean Speed.	When Built.	Armament of each Ship.
		tons.	ft.	in.	ft.	in.	ft.	in.		knots.		
North German Lloyd	George Washington .	27,000	..	..	..	..	..	..	..	20	Bldg.	The armament is of 6-in. and smaller quick-firers.
	Kronprinzessin Cecilie .	19,500	678	0	72	0	29	0	45,000	23½	1906	
	Kaiser Wilhelm II. .	19,500	678	0	72	0	29	0	45,000	23½	1901	
	Kronprinz Wilhelm .	14,800	640	0	66	0	26	3	30,000	23-4	1901	
	Kaiser Wilhelm der Grosse	14,349	625	0	66	0	27	0	28,000	23	1897	
	Trave	5262	436	6	48	0	..	..	1300(a)	18	1886	
Hamburg- America	Deutschland . . .	16,500	662	6	67	0	..	..	34,000	23½	1900	

(a) Nominal horse-power.

Many other vessels of less than 18 knots speed are in the list, including the Berlin (19,200 register tons), 17 knots, launched at Gröpelingen, 1908.

GREECE.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.					Armament.		Speed.	Coal.	Complement.	
											Belt.	Deck.	Side above Belt.	Bulkhead.	Heavy Guns.	Gun Position.	Guns.				Torpedo Tubes.
b.	Hydra	. 4808	334½ ft.	51½ ft.	23½ ft.	7000	St. Nazaire . La Seyne .	1889 1891 1900		..	11½-4	2½	3	in.	13½	in.	3 10-6-in. Canet, 5 5-9-in., 1 3-9-in., 8 2-5-in., 4 1-8-in., 12 1-4-in.	3	17-0 knots.	600 tons.	400
"	Paara	. 4808	334½	51½	23½	7000	Havre . La Seyne .	1890 1892 1897		..	11½-4	2½	3	..	13½	..					
"	Spetsai	. 4808	334½	51½	23½	7000	Havre . La Seyne .	1889 1891 1900		..	11½-4	2½	3	..	13½	..					

GREECE.—Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Guns.	Torpedo Tubes.	Speed.	Coal.	Complement.
											Deck.	Gun Position.					
g.v.	Acheloos	420 tons.	130 ft.	24½ ft.	11½ ft.	400 h.p.	Blackwall	1884	1885	..	in.	in.	2 3-7-in. (K.), 3 m.	..	10-0 knots.	50 tons.	..
"	Alphios	420	130	24½	11½	400	Blackwall	1884	1885	..	..	..	2 3-7-in. (K.), 3 m.	..	10-0	50	..
"	Eurotas	420	130	24½	11½	400	Dumbarton	1884	1885	..	..	..	2 3-7-in. (K.), 3 m.	..	10-0	50	..
corr.	Sfaktirea	1000 tons.	216½ ft.	29½ ft.	18 ft.	2400 h.p.	England.	1885	1886	..	..	..	2 3-9-in. (K.), 2 m.	..	14-5 knots.	100 tons.	..

Torpedo dépôt-ship.—Kanaris, 1100 tons, 500 I.H.P., 2 3-9-in. (Krupp) guns, 14 knots speed. Gunboats, Ambrakia and Aktion, of 440 tons displacement, 380 horse-power, 10 knots speed, fitted with 1 10-2-in. Krupp gun and 2 machine guns; launched 1885.

ITALY.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draft.	Indicated Horse-Power.	Where Built.	Date of Launch.	Cost.	Armour.					Armament.		Speed.	Coal.	Complement.
										Belt.	Deck.	Side above Belt.	Bulkhead.	Heavy Gun.	Second-ary.	Guns.	Torpedo Tubes.		
b.	A . . .	19,000 402½	ft.	ft.	ft.	30,000	(Castellamare Spezia . . .)	Bldg. . . Pro. . .	£	in	ins.	ins.	ins.	ins.	ins.	12 12-in., 18 4-7-in., 16 12-pr.	..	knots.	tons.
"	B . . .	19,000 402½	ft.	ft.	ft.	30,000	(Castellamare Spezia . . .)	Bldg. . . Pro. . .	£	in	ins.	ins.	ins.	ins.	ins.	12 12-in., 18 4-7-in., 16 12-pr.	..	24	..
a.c.	Amalfi . . .	9832 429½	68½	24½	24½	20,800 B.	Genoa (Odoro)	1908	880,000	8-3½ K.S.	1½	7 K.S.	7-6 K.S.	..	..	4 10-in., 8 8-in., 16 3-in., 8 1-8-in.	3 (sub.)	22-5 f	700 1500
b.	Ammiraglio di St. Bon . . .	9645 344½	69½	24½	24½	13,500	Venice . . .	1897 1901	..	9½-4 H.S.	3-1½	6 H.S.	6 H.S.	9½ H.S.	6 H.S.	4 10-in., 8 6-in., 8 4-7-in., 2 2-9-in., 8 2-2-in., 12 1-4-in., 2 M.	4	18-3 f	600 518
l.	Benedetto Brin . . .	13,214 426½	78½	27½	27½	20,400 B.	Castellamare . . .	1901 1904	..	6-2 H.S.	3	6 H.S.	8 H.S.	10 H.S.	6 H.S.	4 12-in., 4 8-in., 12 6-in., 16 3-in., 8 1-8-in., 4 M.	4 (sub.)	19-5 f	1000 719
a.c.	Carlo Alberto . . .	6396 325	59	23	23	13,220 f	Spezia . . .	1896 1898	..	6-4½ H.S.	1½	6 H.S.	..	6 H.S.	4½ shields	12 6-in., 6 4-7-in., 2 2-9-in., 10 1-4-in., 2 M.	4	19-2 f	1000 500
l.	Dandolo . . .	12,071 341	64½	26½	26½	8045	Spezia . . .	1878 1881 1898	872,640	21½	2	17	16	10 H.S.	2 screens	4 10-in. (A.), 8 6-in., 5 4-7-in., 2 2-9-in., 10 1-4-in., 2 M.	4	15-6 f	732 506
b.	Emanuele Filiberto . . .	9645 344½	69½	24½	24½	18,500	Castellamare . . .	1897 1902	..	9½-4 H.S.	3-1	6 H.S.	6 H.S.	9½ H.S.	6 H.S.	4 10-in., 8 6-in., 8 4-7-in., 2 2-9-in., 8 2-2-in., 12 1-4-in., 2 M.	4	18-3 f	600 536
a.c.	Francesco Ferruccio . . .	7294 344	59½	23½	23½	13,500 Nic.	Venice . . .	1902 1904	..	6-3 H.S.	1½	6 H.S.	5 H.S.	6 H.S.	6 H.S.	1 10-in., 2 8-in., 14 6-in., 10 2-9-in., 6 1-8-in., 2 M.	4 (sub.)	20-0 f	655 540
b.	Giuseppe Garibaldi . . .	7294 344	59½	23½	23½	14,713 f	Sestri Ponente (Ansaldo)	1899 1901	..	6-3 H.S.	1½	6 H.S.	5 H.S.	6 H.S.	6 H.S.	1 10-in., 2 8-in., 14 6-in., 10 2-9-in., 6 1-8-in., 2 M.	4 (sub.)	20-0 f	655 540
a.c.	Marco Polo . . .	4511 327	48½	19½	19½	10,543 f	Castellamare . . .	1892 1895	344,400	4	1	4	4	4	..	6 5-9-in., 10 4-7-in., 2 2-9-in., 9 2-2-in., 4 1-4-in., 2 M.	4 (sub.)	19-0 f	600 394
b.	Napoli . . .	12,425 435½	73½	27½	27½	20,000 B. & W.	Castellamare . . .	1905 1909	1,120,000	9½-4 H.S.	2	8 H.S.	8 H.S.	8 H.S.	6 H.S.	2 12-in., 12 8-in., 12 3-in., 12 1-8-in.	2 (sub.)	22-0 f	1000 2000
b.	Regina Elena . . .	12,425 435½	73½	27½	27½	20,000 B.	Spezia . . .	1904 1907	1,120,000	9½-4 H.S.	2	8 H.S.	8 H.S.	8 H.S.	6 H.S.	2 12-in., 12 8-in., 12 3-in., 12 1-8-in.	2 (sub.)	22-0 f	1000 2000

ITALY.—Armoured Ships—continued.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Heavy Guns.	Gun Position.	Torpedo Tubes.				
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.		kts.	tons.		
a.c.	Pisa	9832 429 $\frac{3}{4}$	683 $\frac{3}{4}$	24 $\frac{3}{4}$	24 $\frac{3}{4}$	18,000 B.	Leghorn (Orlando)	1907 1908	..	8-3 $\frac{1}{2}$ K.S.	1 $\frac{3}{4}$	7 K.S.	7-6 K.S.	7-6 K.S.	..	4 10-in., 8 8-in., 16 3-in., 8 1-8-in.	3 (sub.)	23-0	700 1600	..	
b.	Regina Margherita .	13,214 426 $\frac{1}{2}$	78 $\frac{1}{2}$	27 $\frac{1}{2}$	27 $\frac{1}{2}$	20,664 Nic.	Spezia .	1901 1904	..	6 H.S.	3	6 H.S.	8 H.S.	8 H.S.	6 H.S.	4 12-in., 4 8-in., 12 6-in., 16 3-in., 8 1-8-in., 4 M.	4 (sub.)	20-2	1000 2000	719	
"	Re Umberto . . .	13,673 400	76 $\frac{3}{4}$	28 $\frac{1}{2}$	28 $\frac{1}{2}$	19,500	Castellamare .	1888 1893	1,058,500	4	3	4	2 $\frac{3}{4}$	18	..	4 67-ton (A.), 8 6-in., 16 4-7-in., 2 9-in., 15 2-2-in., 14 1-4-in., 2 M.	5	19-0	1200	785	
"	Roma	12,425 435 $\frac{1}{2}$	75 $\frac{1}{2}$	27 $\frac{1}{2}$	27 $\frac{1}{2}$	20,000 B. & W.	Spezia .	1907 ..	1,120,000	9 $\frac{3}{4}$ -4 H.S.	2	8 H.S.	8 H.S.	8 H.S.	6 H.S.	2 12-in., 12 8-in., 12 3-in., 12 1-8-in.	2 (sub.)	22-0	1000 2000	..	
a.c.	{ San Giorgio San Marco . . . }	9832 429 $\frac{3}{4}$	683 $\frac{3}{4}$	24 $\frac{3}{4}$	24 $\frac{3}{4}$	{ Bl. 18000 tur. }	Castellamare .	1908 ..	..	8-3 $\frac{1}{2}$ K.S.	1 $\frac{3}{4}$	7 K.S.	7-6 K.S.	7-6 K.S.	7 K.S.	4 10-in., 8 8-in., 16 3-in., 8 1-8-in.	3 (sub.)	22-5	700 1600	..
b.	Sardegna	13,640 411	76 $\frac{3}{4}$	28 $\frac{1}{2}$	28 $\frac{1}{2}$	19,650 t	Spezia .	1890 1895	1,057,440	4	3	4	2 $\frac{3}{4}$	14 $\frac{1}{2}$ comp.	..	4 67-ton (A.), 8 5-9-in., 16 4-7-in., 2 2-9-in., 20 2-2-in., 10 1-4-in., 2 M.	5	20-1	1200	785	
"	Sicilia	13,087 400	76 $\frac{3}{4}$	28 $\frac{1}{2}$	28 $\frac{1}{2}$	19,500	Venice .	1891 1895	1,050,000	4	3	4	2 $\frac{3}{4}$	18 comp.	..	4 67-ton (A.), 8 5-9-in., 16 4-7-in., 2 2-9-in., 20 2-2-in., 10 1-4-in., 2 M.	5	19-2	1200	785	
a.c.	Varese	7204 344	59 $\frac{3}{4}$	23 $\frac{3}{4}$	23 $\frac{3}{4}$	13,500 B.	Leghorn (Orlando)	1899 1900	..	6-4 $\frac{1}{2}$ H.S.	1 $\frac{3}{4}$	6 H.S.	6 H.S.	5 H.S.	6 H.S.	1 10-in., 2 8-in., 14 6-in., 102-9-in., 61-8-in., 2 M.	4	20-0	650 1200	500	
a.c.	Vettor Pisani . . .	6396 325	59	23	23	13,000	Castellamare .	1895 1897	..	6 H.S.	1 $\frac{3}{4}$	6 H.S.	6 H.S.	..	4 $\frac{1}{2}$ shields H.S.	12 6-in., 6 4-7-in., 2 2-9-in., 10 2-2-in., 10 1-4-in., 2 M.	4	20-0	600	504	
b.	Vittorio Emanuele III	12,425 435 $\frac{1}{2}$	75 $\frac{1}{2}$	27 $\frac{1}{2}$	27 $\frac{1}{2}$	20,000 B.	Castellamare .	1904 1907	1,120,000	9 $\frac{3}{4}$ -4 H.S.	2	8 H.S.	8 H.S.	8 H.S.	6 H.S.	2 12-in., 12 8-in., 12 3-in., 12 1-8-in.	2 (sub.)	22-0	1000 2000	..	

ITALY.—Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draft.	Indicated Horse Power.	Where Built.	Date of Launch.	Date of Completion.	Armour.		Armaments.	Torpede Tubes.	Speed.	Complement.
										Deck.	Gun Position.				
<i>to. cr.</i>	Agordat	1292	287½	30½	11	8000	Castellamare.	1899	1900	..	in.	4 4·7-in., 8 2·2-in., 2 1·4-in.	2	22·0	160 158
<i>to. g. b.</i>	Aretusa	833	230	26½	11½	4420	Leghorn (Orlando).	1891	1892	72,920	1	1 4·7-in., 6 2·2-in., 3 1·4-in.	6	20·7	120 111
<i>3rd cl. cr.</i>	Calabria	2428	249½	42	16½	4094	Spezia.	1894	1897	183,120	2	4 5·9-in., 6 4·7-in., 1 2·9-in., 8 2·2-in., 8 1·4-in., 2 m.	2	16·4	500 257
<i>to. g. b.</i>	Caprera	833	230	27½	10½	4189	Leghorn (Orlando).	1894	1895	72,920	1	2 4·7-in., 4 2·2-in., 2 1·4-in.	5	21·0	120 111
<i>to. cr.</i>	Coatit	1292	287½	30½	11	8160	Castellamare.	1899	1902	..	1	4 4·7-in., 8 2·2-in., 2 1·4-in.	2	21·1	160 158
<i>g. v.</i>	Curtatone	1272	177½	32½	13½	1100	Venice.	1887	1888	58,440	..	4 2·2-in., 2 1·4-in., 2 m.	..	12·0	197 131
<i>3rd cl. cr.</i>	Elba	2689	272½	40½	16½	7471	Castellamare.	1893	1895	200,000	2	4 5·9-in., 6 4·7-in., 1 2·9-in., 8 2·2-in., 8 1·4-in., 2 m.	2	17·9	500 272
"	Etruria	2245	262½	39½	16½	7585	Leghorn (Orlando)	1891	1893	183,120	2	4 5·9-in., 6 4·7-in., 1 2·9-in., 8 2·2-in., 10 1·4-in., 2 m.	2	19·8½	400 257
"	Fieramosca	8534	290	45½	19½	7700	Leghorn (Orlando)	1888	1890	240,120	1½	2 9·8-in., 6 6-in., 1 2·9-in., 5 2·2-in., 8 1·4-in., 2 m.	2	17·5	450 315
<i>g. v.</i>	Governolo	1235	185	33½	13½	1100	Venice.	1894	1896	58,440	..	4 4·7-in., 4 2·2-in., 2 1·4-in., 2 m.	..	13·0	200 131
<i>to. g. b.</i>	Iride	931	229½	27	10½	4242	Castellamare.	1891	1892	72,920	1	1 4·7-in., 6 2·2-in., 3 1·4-in.	6	19·6	120 111

* Shields.

ITALY.—Cruising Ships—continued.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Armour.		Armament.		Speed.	Coal.	Complement.
										Deck.	Gun Position.	Gun.	Torpedo Tubes.			
3rd cl. cr.	Liguria	2245 tons.	262½ ft.	39½ ft.	16½ ft.	7677 ft.	Sestri (Ansaldo)	1893	1894	2 in.	4½ in.	4 5·9-in., 6 4·7-in., 1 2·9-in., 8 2·2-in., 10 1·4-in., 2 m.	2	19·6 knots.	430 tons.	257
"	Lombardia	2351	262½	39½	16½	6843 ft.	Castellamare	1890	1892	2	4½	4 5·9-in., 6 4·7-in., 1 2·9-in., 8 2·2-in., 8 1·4-in., 2 m.	2	17·0	430	257
4th g.b.	Minerva	833	246	27½	11½	4800 W.T.	Sestri (Ansaldo)	1892	1893	1	..	1 4·7-in., 6 2·2-in., 3 1·4-in.	5	21·0	120	111
4th g.b.	Montebello	801	230	25½	11½	2776	Spezia	1888	1899	..	1	6 2·2-in., 2 1·4-in.	4	18·0	100	111
"	Partenope	821	246	27½	11½	4200	Castellamare	1890	1890	..	1	1 4·7-in., 6 2·2-in., 3 1·4-in.	4	19·0	100	111
3rd cl. cr.	Piemonte	2537	300	38	15	12,000	Elswick	1888	1890	3	3	6 6·6-in., 6 4·7-in., 10 2·2-in., 6 1·4-in., 4 m.	2	21·0	560	325
"	Puglia	2498	269	41	16½	7000	Taranto	1898	1900	4½	1	4 5·9-in., 6 4·7-in., 1 2·9-in., 8 2·2-in., 8 1·4-in., 2 m.	2	20·0	650	257
3rd cl. cr.	Umbria	2245	262½	39½	16½	7104 ft.	Leghorn (Orlando)	1891	1893	4½	2	4 5·9-in., 6 4·7-in., 8 2·2-in., 10 1·4-in., 1 1·2 m.	2	18·83	430	257
4th g.b.	Urania	833	230	27	11½	4397 ft.	Sestri (Odoro)	1891	1892	..	1	1 4·7-in., 6 2·2-in., 3 1·4-in.	6	20·0	120	111
3rd cl. cr.	Vesuvio	3373	282½	42½	19	6820	Leghorn (Orlando)	1886	1888	5	1·5	2 9·8-in., 6 5·9-in., 1 2·9-in., 5 2·2-in., 8 1·4-in., 2 m.	2	17·0	600	315
g.v.	Volturno	1155	177½	32½	14½	1100	Venice	1887	1888	..	..	4 4·7-in., 4 2·2-in., 2 1·4-in., 2 m.	..	13·0	206	131

Etna (3474 tons), converted into a training ship. Goito and Tripoli, mining vessels. Subsidised auxiliary cruisers and despatch vessels.—Nord America (La Veloce S.S. Co.), Regina Margherita, Galileo Galilei, Marco Polo, Umberto I., Cristoforo Colombo, Elettrico, Candia, Malta, Persico, Orione, and some others (Navigazione Generale). The armament of these vessels is 2·2-in. q.v., and 4 1·4-in. m. The coal and liquid fuel transports Bronte and Sterope (9430 tons) are completed. Provision is made for a scout-cruiser, S; for a docking vessel for submarines, and for a river gunboat.

JAPAN.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Cost.	Armour.					Armament.		Speed.	Coal.	Complement.
										Belt.	Deck.	Side above Belt.	Bulkhead.	Heavy Guns.	Gun Position.	Guns.*				Torpedo Tubes.
b.	A	40,800	479	85½	27½	26,500 tur.	Kure	{ Bldg. } { Pro. }	..	in. 12-9½	in. ..	in. ..	in. ..	in. ..	12 12-in., 10 6-in., 12 4-7-in.	5 (sub.)	20-0	..	..
"	B																		
a.c.	Three Ships †.	78,650	545	80	26½	44,000	..	Pro. ..	..	7-4	2	6	..	..	6 12-in., besides 6-in. and 4-7-in.	5 (sub.)	25-0	..	..
a.c.	Adzuma	9436	431½	59½	24½	17,000 St. Nazaire B.	1899	1901	..	7-3½	3	5	..	6	4 8-in., 12 6-in., 12 3-in., 8 1-8-in.	5 (4 sub.)	20-0	600	482
b.	Aki	19,800	482	83½	27½	18,000 Kure	1907	..	..	9-5	2-3	8	..	9	4 12-in., 10 10-in., 8 6-in., 8 12-pr., 4 m.	5 (4 sub.)	20-5	127½	..
"	Asahi	15,800	400½	75½	27½	15,000 Clydebank B.	1899	1900	..	K.S.	4-2½	6	12	14	6 4 12-in., 14 6-in., 20 12-pr., 8 3-pr., 4 2½-pr.	4 (sub.)	18	700	750
a.c.	Asama	9700	408	67	24½	19,000 Elswick t	1898	1899	..	7-3½	2	5	..	6	4 8-in., 14 6-in. (A.), 12 12-pr., 8 2½-pr.	5 (sub.)	22-1	1549	482
"	Aso (ex Bayan)	7726	443	55½	22	17,400 La Seyne My. t.	1900	1902	..	8-3	2	3	..	7	2 8-in., 8 6-in., 32 2-9-in., 20 3-pr., 6 1-pr. 31., and m.	2 (sub.)	22	1409	..
a.c.	Chiyoda	2450	308	42½	14	5700 Clydebank B.	1889	1890	..	K.S.	1-2	..	..	..	10 4-7-in., 14 3-pr., 3 m.	3	17-5	420	300
b.	Fuji	12,320	374	73	26½	14,000 Thames B.	1896	1897	..	18-6	4-2½	4	..	14	6 4 12-in., 10 6-in., 20 3-pr., 4 4½-pr.	5 (4 sub.)	19-2	1100	600
"	Hizen (ex Retvizan)	12,700	374	72½	25	16,000 Philadelphia My.	1900	1902	..	H.S.	4	6-2	9	10	5 4 12-in., 12 6-in., 20 3-pr., 6 1-pr.	2	18-0	800	..
a.c.	Ibuki	14,620	450½	75½	26½	27,000 Kure	1907	..	..	K.S.	2	5	..	9	4 12-in., 8 8-in., 12 4-7-in., 3 1-8-in., 2 l., 4 m.	3 (sub.)	22	2000	..
b	Idzumo	9750	400	68½	24½	17,300 Elswick B. t.	{ 1899 } { 1900 }	1901	..	7-3½	2½	5	..	6	4 8-in., 14 6-in., 12 12-pr., 8 2½-pr.	4 (sub.)	22-0	600	672
"	Iwate									H.N.S.		H.N.S.		H.N.S.		21-7	1412	..	..
b.	Iki (ex Nicolai I)	9672	326	67	23	8000 St. Petersburg B.	1888	1892	..	14-6	2½	..	..	10	6 2 12-in., 4 9-in., 8 6-in., 12 q-r., 8 m., 4 l.	6	14-8	600	600
a.c.	Ikoma	13,750	440	75	26	20,500 Kure	1906	1907	..	7-5	..	..	..	7	4 12-in., 12 6-in., 12 4-7-in., 2 1-8-in., 2 l., 4 m.	3 (sub.)	21-0	..	817

* All Q.R. guns and 12-in. for new ships are Armstrong.

† Mean draught.

‡ Particulars uncertain.

JAPAN.—Armoured Ships—continued.

Class.	NAME.	Displacement.	Length.	Beam.	Tonsht.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.					Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position.	Guns.*	Torpedo Tubes.			
b.	Iwami (ex Orel)	13,516-307½	76	26	16,000	St. Petersburg	1902	1904	..	..	in. 9-4 K.S.	in. 2½-1½ K.S.	in. 6 K.S.	in. 9 K.S.	in. 10 K.S.	4 12-in., 6 8-in., 20 3-in., 20 3-pr., 6 1-pr.	2 (2 sub.)	18-0	800	740
"	Kashima	16,400-425	78½	26½	17,280	Elswick	1905	1906	..	..	in. 9-4 K.S.	in. 3-2½ K.S.	in. 6 K.S.	in. 6 K.S.	in. 9 K.S.	4 12-in., 4 10-in., 12 6-in., 12 12-pr., 3 3-pr., 6 m., 21.	5 (sub.)	19-2	750	980
a.c.	Kaoga	7299-344	59½	24½	13,500	Sestri	1902	1904	760,000	..	in. 6 H.N.S.	in. 1½ K.S.	in. 6 H.N.S.	in. 6 H.N.S.	in. 6 H.N.S.	1 10-in., 2 8-in., 14 6-in., 10 3-in., 6 1-8 in., 2 m.	4	20-0	600	500
b.	Katori	15,950-420	78	27½	18,500	Barrow	1905	1906	..	..	in. 9-5 K.S.	in. 3-2 K.S.	in. 6 K.S.	in. 6 K.S.	in. 10 K.S.	4 12-in., 4 10-in., 12 6-in., 10 12-pr., 3 3-pr., 6 m., 21.	5 (sub.)	19-5	750	..
a.c.	Kurama	14,620-450½	75½	26½	27,000	Yokosuka	1907	..	..	..	in. 7-4 K.S.	in. 2 K.S.	in. 5 K.S.	in. 5 K.S.	in. 9 K.S.	4 12-in., 8 8-in., 12 4-7-in., 3 1-8-in., 21, 4 m.	3 (sub.)	22-0	2000	..
b.	Mikasa	15,200-400	76	27½	16,431	Barrow	1900	1902	..	..	in. 9-4 H.N.S.	in. 3 H.N.S.	in. 6 H.N.S.	in. 12 H.N.S.	in. 14 H.N.S.	4 12-in., 4 10-in., 10 6-in., 20 12-pr., 12 small, 8 m.	4 (sub.)	18-5	700	935
c.d.	Minoshima (ex Seniavine)	4792-265	52½	17	5000	St. Petersburg	1894	1895	410,000	..	in. 10 H.N.S.	in. 3 H.N.S.	in. 6 H.N.S.	in. 6 H.N.S.	in. 7-8 H.N.S.	4 9-in., 4 4-7-in., 6 1-8-in., 8 m.	4	16-0	400	318
a.c.	Nisshin	7700-344	59½	24½	13,500	Sestri	1903	1904	760,000	..	in. 6 H.N.S.	in. 1½ H.N.S.	in. 6 H.N.S.	in. 6 H.N.S.	in. 6 H.N.S.	6 1-8-in., 2 m.	4	20-0	600	500
c.d.	Okinoshima (ex Apraxine)	4126-277½	52½	17½	5757	St. Petersburg	1896	1898	..	..	in. 10 H.S.	in. 3 H.S.	in. 6 H.S.	in. 6 H.S.	in. 7½ H.S.	3 10-in., 4 4-7-in., 10 1-8-in., 12 1-4-in.	4	15-0	215	318
b.	Sagami (ex Peresviet)	12,674-401½	71½	26	14,500	St. Petersburg	1898	1901	..	..	in. 9-7 H.S.	in. 2½ H.S.	in. 6 H.S.	in. 9 H.S.	in. 6 H.S.	4 12-in., 11 6-in., 16 12-pr., 10 3-pr., 17 1-pr.	5	18-0	800	732
"	Satsuma	19,350-482	83½	27½	18,000	Yokosuka	1906	..	..	..	in. 9-5 K.S.	in. 2-3 K.S.	in. 8 K.S.	in. 8 K.S.	in. 9 K.S.	4 12-in., 12 10-in., 12 4-7-in., 4 12-pr., 4 m.	5 (4 sub.)	20-5	2058	..
"	Shikishima	14,850-400	75½	26½	16,355	Thames	1898	1899	..	..	in. 9-4 H.N.S.	in. 4-2½ H.N.S.	in. 6 H.N.S.	in. 12 H.N.S.	in. 14 H.N.S.	4 12-in., 14 6-in., 20 12-pr., 8 m.	5 (4 sub.)	18-3	700	741
"	Suo (ex Pobieda)	12,674-401½	71½	26	14,500	St. Petersburg	1900	1901	..	..	in. 9½-4 H.S.	in. 2½ H.S.	in. 9 H.S.	in. 9 H.S.	in. 9 H.S.	4 12-in., 11 6-in., 16 12-pr., 10 3-pr., 17 1-pr., 21.	5	18-0	800	732
"	Tango (ex Poltava)	10,960-367½	69	26	11,255	St. Petersburg	1894	1898	1,098,000	..	in. 15½ H.S.	in. 3½ H.S.	in. 4 H.S.	in. 9 H.S.	in. 10 H.S.	4 12-in., 12 6-in., 14 small	4	16-0	900	700
a.c.	Tokiwa	9700-408	67	24½	20,556	Elswick	1898	1899	..	..	in. 7-3½ H.S.	in. 2 H.S.	in. 5 H.S.	in. 5 H.S.	in. 6 H.S.	4 8-in., 14 6-in. (A.), 12 12-pr., 8 2½-pr.	5 (4 sub.)	23-0	600	500
"	Teukuba	13,750-440	75	26	20,500	Kure	1905	1907	..	..	in. 7-5 K.S.	in. 5 K.S.	in. 5 K.S.	in. 5 K.S.	in. 7 K.S.	4 12-in., 12 6-in., 12 4-7-in., 2 1-8 in., 21, 4 m.	3 (sub.)	21-0	1409	817
"	Yakumo	9850-407½	64½	23½	16,000	Stettin	1899	1901	..	..	in. 7-3½ H.S.	in. 2½ H.S.	in. 5 H.S.	in. 5 H.S.	in. 6 H.S.	4 8-in. (A.), 12 6-in., 12 12-pr. (A.), 8 2½-pr.	5 (4 sub.)	20-0	600	500

† Mean draught.

• All Q.R. guns and 12-in. for new ships are Armstrong.

JAPAN.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost	Armour.		Armament.		Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	Deck.	Gun Position.	Guns.				tons.	
<i>g.n.</i>	Akagi . . .	615	164	27	10	700	Yokosuka .	1889	1891	2	in.	in.	1 8-2-in., 1 5-9-in., 2 l., 2 m.		..	13-0	60	113
<i>c.r.</i>	Akashi . . .	2657	295½	41½	16½	8500	Yokosuka .	1897	1898	327,000	2	4½ shield	2 6-in. (A.), 6 4-7-in., 10 3-pr., 2 2½-pr., 4 m.	10	2	20-0	200	..
"	Akitsuhashima . . .	3150	302	42½	18½	8400	Yokosuka .	1892	1893	..	8	..	4 6-in., 6 4-7-in., 10 3-pr.	.	4	19-0	544	330
<i>t.g.b.</i>	Chihaya . . .	1250	273	31½	10	5500	Yokosuka .	1900	1901	..	..	..	2 4-7-in., 4 12-pr.	.	5	21-0	123	..
<i>c.r.</i>	Chitose . . .	4760	395	49	18	15,500	San Francisco	1898	1899	205,200	4½	4½ shield	2 8-in., 10 4-7-in., 12 12-pr., 6 2½-pr.	12	4	22-5	344	405
"	Hashidate* . . .	4277	295	50½	21½	5400	Yokosuka .	1891	1898	..	2	12	1 12-6-in. (Canet), 11 4-7-in., 5 6-pr., 11 3-pr., 6 m.	.	4	17-0	350	350
"	Itatsukushima* . . .	4277	295	50½	21½	5400	La Seyne .	1891	1893	..	..	..	2 8-in., 10 4-7-in., 12 12-pr., 6 1-8-in.	.	4	22-7	1000	405
"	Kasagi . . .	5416	374½	48½	19	18,492	Philadelphia	1898	1899	205,200	4½-1½	4½ shield	2 6-in. (K.), 5 4-7-in., 2 m.	.	2	13-0	..	242
<i>t.c.</i>	Katsuraki . . .	1476	206½	36	15	1600	Yokosuka .	1885	1887	..	..	..	2 4-7-in., 4 12-pr.	.	2	23-0	..	..
"	Musaahi . . .	1329	316	31½	9½	8000	Sasebo	1907	1908	..	2½	..	2 1-8-in., 7 1-4-in., 3 m.	.	3	22-0	90	87
<i>Scout</i>	Magami . . .	400	192½	24½	7½	3300	Elbing .	1892	1892	111,000	..	..	1 8-2-in., 1 4-7-in., 2 m.	.	..	13-0	60	113
<i>t.g.b.</i>	Makigumo . . . (ex Posadnik)	615	164	27	10	700	Yokosuka .	1886	1887	..	..	..	8 6-in., 2 3-pr., 10 m.	.	4	18-72	800	350
<i>g.v.</i>	Maya . . .	3700	300	46	18½	7235	Elswick .	1885	1886	..	8	1½ shield	6 6-in., 10 8-in., 4 2½-pr.	.	..	20-0	600	..
<i>c.r.</i>	Naniwa* . . .	3365	255½	44	16½	10,000	Yokosuka .	1902	1905	..	2½	..	2 6-in., 6 4-7-in., 4 12-pr., 2 m., 2 l.	.	..	20-0	600	..
"	Niitaka . . .	3000	341	42½	17	10,000	Yokosuka .	1903	1904	..	..	..			..	20-0	600	875

* Reported to have been removed from the active list.

JAPAN.—Cruising Ships, &c.—continued.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
		tons.	f.	f.	f.					£	Deck.	Gun Position.	Gun.	Torpedo Tubes.	knots.	tons.	
<i>t.g.l.</i>	Shikunami . (<i>ex</i> Gailamak)	400	192½	24½	7½	3000	Abo, Finland	1893	1894	..	in.	in.	2 1·8-in., 7 1·4-in., 10 M.	3	22·0	90	87
<i>cr.</i>	Soya . (<i>ex</i> Varyag)	6500	420	52	20½	20,000 My.	Philadelphia	1899	1900	..	3	..	12 6-in., 12 12-pr., 6 3-pr.	3	23·0	770	571
"	Suma .	2657	306½	40	16½	8500	Yokosuka .	1896	1898	237,000	2	4½ ahfield	2 6-in., 6 4·7-in., 12 3-pr.	2	20·0	200	..
"	Sutsuya . (<i>ex</i> Novik)	3080	347	41½	16	18,000 Danzig	(Schichau)	1900	1902	..	2	..	2 6-in., 4 4·7-in. .	2	25·0	600	..
"	Takao .	1774	280	33	13	2330 My.	Yokosuka .	1888	1889	..	..	..	4 6-in., 1 4·7-in., 6 M. .	..	15·0	300	255
"	Takachiho*	3700	300	46	18½	7500	Elswick .	1885	1886	..	3	1½ ahfield	2 10·2-in. (A.), 6 6-in., 2 3-pr., 10 M.	4	18·7	800	365
<i>t.g.l.</i>	Tatuta*	875	240	27½	13	5500	Elswick .	1894	1894	..	..	..	2 4·7-in., 4 3-pr. .	5	21·0	200	..
<i>cr.</i>	Tone . A . B .	4035	400	48½	16½	15000 My.	Kobe Sasebo Sasebo	1906 1907 Bldg. .	1908 .. ..	..	2-3	..	2 6-in., 10 4·7-in., 2 12-pr. .	3	23·0	..	392
"	Tsugaru . (<i>ex</i> Pallua)	6630	413½	55½	21	11,610 St. Petersburg	(Gulerny)	1899	1902	..	2½	..	8 6-in., 20 12-pr., 8 1-pr. .	4	20·0	900	422
"	Tsukushi .	1350	210	32	15	2887 My.	Elswick .	1882	1893	..	..	..	2 10-in. (A.), 4 4·7-in., 2 1., 4 M.	2	16·5	250	190
"	Tsushima .	3365	235½	44	16½	10,000 Kure	..	1902	1904	..	2½	..	6 6-in., 10 3-in., 4 2½-pr. .	..	20·0	600	..
<i>g.l.</i>	Uji .	620	180	27½	10	Nic. B.	Kure .	1903	1905	..	..	..	4 12-pr., 3 M. .	..	13·0	100	..
<i>cr.</i>	Yayeyama*	1600	315	34½	15	6000	Yokosuka .	1889	1890	..	..	..	3 4·7-in., 6 M. .	2	20·0	..	200
"	Yamato .	1476	206½	36	15	Nic. 1600	Yokosuka .	1885	1886	..	..	..	2 6·6-in. (K.), 5 4·7-in., 4 M.	2	13·0	..	242
<i>Scout</i>	Yodo .	1230	300	32	9½	6500	Sasebo .	1906	1908	..	2½	..	2 4·7-in., 4 12-pr. .	2	22·0	..	..

Amakusa, mining vessel (*ex* Amur).
 * Reported to have been removed from the active list.

NETHERLANDS.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Cost.	Armour.					Armament.		Speed.	Coal.	Complement.	
										Belt.	Deck.	Side above Belt.	Bulkhead.	Heavy Guns.	Gun Position.	Second-ary.				Guns.	Torpedo Tubes.
c.d.s.t.	De Ruyter . .	5014	316½	51½	21½	6377	Amsterdam .	1900	1904	2	in.	in.	in.	in.	in.	29-4-in., 4 5-9-in., 10 2-9-in., 4 1-4-in.	3	16-5	680	144
"	Evertsen . .	3464	282½	47	16½	4735	Flushing .	1894	1896	..	H.N.S. 6-4	..	..	..	H.N.S. 9½	38-2-in., 2 5-9-in., 6 2-9-in., 8 1-4-in.	2 sub. 3	16-0	280	268
"	Hertog Hendrik .	5014	316½	51½	21½	6000	Amsterdam .	1902	1903	347,500	6	2	..	..	10	29-4-in., 4 5-9-in., 10 2-9-in., 4 1-4-in., 2 l.	3	16-5	680	444
t. & b.	Jacob van Heemskerck	5211	316½	51½	21½	6000	Amsterdam .	1906	1908	347,500	6-4	2	..	..	10	29-4-in., 6 5-9-in., 10 12-pr., 4 1-4-in., 2 l.	3	16-0	680	441
c.d.s.t.	Koningin Regentes	5014	316½	51½	21½	7290	Amsterdam .	1900	1902	347,500	6-4	2	..	..	10	29-4-in., 4 5-9-in., 6 2-9-in., 4 1-4-in., 2 l.	3	16-5	680	444
t. & b.	Koningin Wilhelmina der Nederlanden . abd.	4527	327½	48½	20	4800	Amsterdam .	1892	1894	..	..	3	..	..	11	1 11-in., 1 8-2-in., 2 6-6 in., 2 6-6-in., 4 2-9-in., 4 1-4-in., 6 1-4-in., 2 M.	4	16-5	448	293
c.d.s.t.	Kortenaar . .	3464	282½	47	16½	4638	Amsterdam .	1894	1896	..	6	2	..	..	9½	38-2-in., 2 5-9-in., 6 2-9-in., 8 1-4-in.	3	16-0	280	260
t. & b.	Marten Tromp .	5211	316½	51½	21½	6377	Amsterdam .	1904	1906	347,500	H.S. 6-4	2	..	..	10	29-4-in., 4 5-9-in., 10 2-9-in., 4 1-4-in.	3	16-5	680	444
"	Piet-Hein . .	3464	282½	47	16½	4736	Rotterdam .	1894	1896	..	6	2	..	..	9½	38-2-in., 2 5-9-in., 6 2-9-in., 8 1-4-in.	3	16-2	280	260
"	Reinier Claassen .	2440	229½	44½	15	350	Amsterdam .	1891	1892	..	4½-2	3	..	..	11	1 8-2-in. (K.), 1 6-6-in., 1 8-2-in., 4 1-9-in., 3 1-4-in.	2	12-5	88	160
"	De Zeven Provinciën	6625	389½	56	20½	7500	Amsterdam .	Bldg . .	..	..	6-4	2	..	..	10	2 11-in., 4 5-9-in., 10 12-pr.	..	16-0	700	440

Two coast-defence vessels of 850 tons and three monitors of 680 tons projected.

NETHERLANDS.—Cruising Ships.

((I) denotes vessels of the Dutch Indian Navy.)

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.			
<i>g. v.</i>	Assahan (I)	787	179	30½	11½	1353	Rotterdam	1900	1900	£	Inches.	Inches.	13-0	120	95
"	Borneo (I)	787	179½	31	13½	1040	Glasgow	1892	1893	..	..	6 4-7-in., 2 2-9-in., 4 1-4-in.	13-0	124	106
"	Eel (I)	787	179½	30½	11½	1100	Flushing	1897	1898	..	..	3 4-7-in., 2 2-9-in., 4 1-4-in.	13-0	113	95
<i>cr.</i>	Friesland	8947	307	49	17½	10,000	Rotterdam	1896	1898	285,700	2	2 5-9-in., 6 4-7-in., 4 2-9-in., 8 1-4-in., 4 smaller.	19-8	400	333
"	Gelderland.	3969	310½	49	17½	10,000	Fuizenoord	1898	1900	..	2½	2 5-9-in., 6 4-7-in., 4 2-9-in., 4 1-4-in., 4 M.	20-0	850	333
"	Holland	3847	307	49	17½	10,000	Amsterdam	1896	1898	285,700	2	2 5-9-in., 6 4-7-in., 4 2-9-in., 8 1-4-in., 4 M.	19-6	400	333
"	Koetsel (I)	778	179	30½	11½	1412	Amsterdam	1898	1899	..	..	3 4-7-in., 2 2-9-in., 4 1-4-in.	13-0	120	97
"	Lombok (I)	591	176	27½	11	990	Amsterdam	1891	1892	..	..	3 4-7-in., 1 2-9-in., 2 3-pr.	12-0	55	84
"	Mataram (I)	797	179½	30½	11½	1100	Amsterdam	1896	1897	..	..	3 4-7-in., 2 3-in., 2 1-4-in.	13-0	113	95
"	Nias (I)	797	179½	30½	11½	1227	Amsterdam (Huygens)	1895	1896	..	..	3 4-7-in., 2 2-9-in., 4 1-4-in.	13-0	120	95
<i>cr.</i>	Noord-Brabant.	3969	310½	49	17½	10,000	Flushing	1899	1901	..	2½	2 5-9-in., 6 4-7-in., 4 2-9-in., 4 1-4-in., 4 M.	20-0	850	333
"	Serdang (I)	797	179½	30½	11½	1100	Flushing	1897	1898	..	..	3 4-7-in., 2 2-9-in., 4 1-4-in.	13-0	113	95
<i>g. v.</i>	Siboga (I)	778	179	30½	11½	1395	Amsterdam	1898	1899	..	..	3 4-7-in., 2 2-9-in., 4 1-4-in.	13-0	120	95
<i>cr.</i>	Sumatra (I)	1693	229½	37	14	3750	Amsterdam	1890	1892	..	1½	1 8-2-in., 1 5-9-in., 2 4-7-in., 1 2-9-in., 4 3-pr., 2 M.	17-0	225	183
<i>g. v.</i>	Sumbawa (I)	591	176	26½	11½	930	Flushing	1891	1892	..	..	3 4-7-in., 1 2-9-in., 2 3-pr.	12-5	60	84
<i>cr.</i>	Utrecht	3969	310½	49	17½	10,000	Amsterdam	1898	1900	..	2½	2 5-9-in., 6 4-7-in., 4 2-9-in., 4 1-4-in., 4 M.	20-0	850	333
"	Zeeland	3847	307	49	17½	10,580	Flushing	1897	1898	285,700	2	2 5-9-in., 6 4-7-in., 4 2-9-in., 8 1-4-in., 4 M.	19-4	400	333

Gun-vessels of the Indian Navy: Arend, Flamingo, Raaf, Reiger, Zeeduilf, Zwaan, Pelikuan, Coudor, Gier, Zeemeeruw, Zwaluw (400 tons), launched between 1880 and 1891; Java (1979 tons), 1885; Ceram and Flores (541 tons), 1887; Glatik (417 tons), 1894; Havik, Snip, Sperwer, Kwartel, Farrant, and Valk between 1894 and 1903; Argus and Oycloop (488 tons), 1898.

NORWAY.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.				Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns. Second-ary.	Guns.				Torpedo Tubes.
c.i.s.	Eidsvold . Norge .	3847	290	50½	16½	4500 Y.	Elswick	1900	1901	350,000	in.	in.	..	..	in.	in.	2 8-2-in., 6 5·9-in., 8 12-pr., 6 3-pr.	2 16·5 sub. t 600	261
	Harald Haarfagre . Torkenakjold										6 H.N.S.	2	6 H.N.S.	2 8-in., 6 4·7-in., 6 12-pr., 6 1½-pr.		2 17·2 sub. t 500	248
"																			
"																			

Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.		
g.b.	Eger .	387	108½	29½	8	450	Horten	1892	1893	..	in.	in.	1 8·2-in., 1 2·7-in., 2 1·9-in.	..	43	128
	Elhda .										1½	..	5 5·9-in. 4-ton (K.), 1 4·7-in., 1 1., 2 M.	..		
"	Frithjof .	1349	216½	32½	13½	300	Horten	1896	1898	..	..	..	2 4·7-in., 4 2·9-in., 4 1·4-in., 2 l.	..	156	62
	Heimdal .										..	..	4 2·5-in.	..		
to g.b.	Valkyrien .	374	190	24½	9½	3300	Elbing.	1896	1897	..	..	..	2 2·7-in., 1 M.	..	57	156
	Viking .										1½	..	2 5·9-in. (A.), 4 2·5-in., 4 1·4-in., 2 M.	..		

Eleven Gunboats, of 189 to 280 tons, and of 180 to 450 I.H.P., armed with one large gun and machine guns in each.

PORTUGAL.—Armoured Ship.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.				Armament.		Speed.	Coal.	Complement.		
											Belt.	Deck.	Side above Belt.	Bulkhead.	Heavy Gun.	Second-ary.				Gun Position.	Gun.	Torpedo Tubes.
b.	Vasco da Gama	2972 tons.	233 ft.	40 ft.	18½ ft.	6000 W.T.	Blackwall Leghorn	1876	1878	132,000 g.-4	2 in.	3 in.	6 in.	in.	7½ in.	in.	2 8-in., 4 4-7-in., 2 2-5-in., 2 1-pr., 4 m.	2	15-5 knots (sub.)	300 tons.	218

Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Normal Coal Supply.	Complement.
		tons.	f.	f.	f.					£	Deck.	Gun Position.	Gun.	Torpedo Tubes.	knots.	tons.	
cr.	Adamastor	1902	250	35	14	4000	Leghorn	1896	1897		in.	in.	2 5-9-in., 4 4-7-in., 4 2-2-in., 4 m.	3	18-0 f	270	232
cr.	Dom Carlos I.	4100	360	46½	17½	12,500 Y.	Elswick	1898	1899		4	..	4 5-9-in. (A.), 8 4-7-in., 12 3-pr., 6 1-pr., 4 m.	5 (3 sub.)	22-0	1000	260
g.v.	Dom Luiz I.	710	151	27½	13½	512	Lisbon	1895	1896		..	..	4 4-7-in., 3 2-5-in., 3 m.	..	9-9	100	..
g.v.	Patria	620	196½	27½	8½	1800	Lisbon	1903	1905		..	..	4 4-in., 6 1-8-in.	..	15-0	..	..
cr	Rainha Amelia	1640	246	36	14½	5000 Nor.	Lisbon	1899	1901		1	..	4 5-9-in., 2 3-9-in., 2 3-pr., 4 m.	2	20-6 f	..	250
"	São Gabriel	1772	246	35½	14½	4000 N.S.	Havre	1898	1899	..	1½	..	2 5-9-in. (Cane), 4 4-7-in., 8 1-8-in., 2 m.	1	17-5 f	500	200
	São Rafael																

About 20 small gunboats, including two gunboats of 220 tons, the Al. Baptista de Andrade and Thomas Andrea, for Mozambique and Timor, 29 river-gunboats, and two building at Lisbon.

RUSSIA.—Armoured Ships. (B.S., Black Sea Fleet.)

Class.	NAME.	Displacement.	Length.	Beam.	Draft.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.					Armament.			Speed.	Normal Coal Supply.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkheads.	Heavy Guns.	Gun Position.	Guns.	Guns.				Second-ary.	Torped Tubes.
a.c.	Admiral Makaroff .	7900 443	75½	23	16,500	La Seyne B.		1906	1907	£	in. 6½-4	2	in. 3	5½	in. 3	28-in., 86-in., 20 12-pr., 4 6-pr.	2	22-5	750 573		
h.	Alexander II . shd.	9244 326	67	23	8000	St. Petersburg.		1887	1890	..	14-6	2½	..	6	10	2 12-in., 4 9-in., 8 6-in., 4 6-pr., 4 3-pr., 6 m.	5	16-5	1200 604		
b.	Andreï Pervozvannyi	17,200 429½	79½	28½	17,600	St. Petersburg. (Galeruy) B.		1906	..	1,170,000	11-6	2½	5	..	12	7 4 12-in., 12 8-in., 20 4-7-in., 14 smaller	5 4 sub.	18-0	1500 ..		
a.c.	Bayan . .	7900 443	75½	23	16,500	St. Petersburg B. (New Admiralty)		1907	..	..	6½-4	2	3	6½	5½	3 28-in., 86-in., 20 12-pr., 4 6-pr.	5	21-0	750 573	
b.	Cesarevitch .	12,912 388½	76½	26½	16,300	La Seyne B.		1901	1902	..	9½-4	2½	6	9	10-11	6½ 4 12-in., 12 6-in., 20 3-in., 20 1-8-in., 6 1-4-in., 4 m., 2 l.	2	19-6	900 732		
l.	Dvenadsat Apostoloff (Twelve Apostles), B.S.	8133 330	60	26	11,500	Nicolaïeff		1890	1892	..	14-6	2½	10	12	12	5 4 12-in., 4 6-in., 8 3-pr., 10 m.	6	16-6	800 500		
h.	Evstafi, B.S.	12,733 372½	72½	27	10,600	Nicolaïeff B.		1906	..	..	9-3	2½	6	7-5	10	5 4 12-in., 4 8-in., 12 6-in., 14 3-in., 8 1-8-in., 2 1-4-in., 6 m., 2 l.	5	16	670 731	
b.	Georgi Pobledonosetz B.S.	10,280 320	69	26½	10,600	Sebastopol 13,468		1892	1896	*431,000	16-11	..	12	..	12	6 12-in., 7 6-in., 8 3-9-in., 6 m.	7	16-5	700 500		
a.c.	Gromoboi . . shd.	12,336 473	68½	26	14,500	St. Petersburg (Baltic)		1899	1900	..	6	3	4½	6	6	4½ 4 8-in., 16 6-in., 20 3-in., 36 small Q.F. and m.	4 4 sub.	20-0	2500 814		
a.g.h.	Grozjastchy .	1492 229	41½	11	2000	St. Petersburg B.		1890	1891	..	5	1½	..	3½	..	1 9-in., 1 6-in., 8 Q.F.	2	15-0	100 120		

• Exclusive of armament.

RUSSIA.—Armoured Ships—continued. (B.S., Black Sea Fleet.)

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Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Completion.	Cost.	Armour.				Armament.		Speed.	Coal supply.	Complement.
		tons.	ft.	ft.	ft.					Belt.	Deck.	Side above belt.	Bulkheads.	Gun Position.	Guns.	Torpedo Tubes.		
b.	Ioann Zlatoust, B.S.	12,733	372½	72½	27	10,600	Sebastopol	1906	..	in. 9-3	in. 2½	in. 6	in. 7-5	in. 12-10	4 12-in., 4 8-in., 12 6-in., 14 5-in., 8 1-8-in., 2 1-4-in., 6 M., 21.	5	knots. 16-0	6704 636
a.g.b.	Khrabry	1735	229	41½	11	3000	St. Petersburg (New Admiralty)	1895	1896	..	5	..	3½	..	2 8-in., 8 Q.F.	2	15-0	100 120
a.c.	Pallada	7900	413	75½	23	16,500	St. Petersburg (New Admiralty)	1906	..	6½-4	2	3	6½	5½	28-in., 8 6-in., 20 12-pr., 4 6-pr.	5	21-0	750 573
incl. a.c.	Pamyat Azova shd.	6734	377	51	23	8000	St. Petersburg	1888	1890	comp.	9	..	8	comp.	28-in., 13 6-in., 14 Q.F., and 3 M.	3	18-8	1000 525
b.	Panteleimon, B.S. (ex Potemkine)	12,480	372½	72½	27	10,600	Nicolaieff	1900	1902	9-3	2½	6	7-5	12-10	4 12-in., 16 6-in., 14 5-in., 6 1-8-in., 14 sub.	5	17-0	6704 636
b.	Pavel I (Imperator)	17,200	429½	79½	28½	17,600	St. Petersburg (Baltic)	1907	..	11-6	2½	5	..	12	4 12-in., 12 8-in., 20 4-7-in., 14 smaller.	5	18-0	1500 ..
a.c.	Rossia	12,130	480	68½	26	14,500	St. Petersburg	1896	1898	10 5	2½	4	6	2	4 8-in., 16 6-in., 12 5-in., 36 small Q.F. & M.	5	20-0	2500 725
b.	Rostislav, B.S.	8880	341	66½	24	8500	Nicolaieff	1896	1899	15½-8	2-3	5	5	15½	4 10-in., 8 5-9-in. (Canet), 12 1-8-in., 4 1-5-in., 2 M.	6	16-0	\$550 624
a.c.	Rurik	15,170	490	75	26	19,700	Barrow	1906	1907	6-3	1½	3	3	8	4 10-in., 8 8-in., 20 4-7-in., 18 smaller.	2	21-0	1200 800
b.	Sinope, B.S.	10,180	331	69	26½	13,000	Sebastopol	1887	1890	16-11	3	14	12	14	6 12-in., 7 6-in., 8 Q.F., 6 M.	7	16-75	886 325
b.	Slava	13,516	307½	76	26	16,000	St. Petersburg (Baltic)	1903	1906	9-4	4	6	9	10	4 12-in., 12 6-in., 20 5-in., 20 3-pr., 6 1-pr.	2	18-0	1250 740
b.	Tria Sviatitelia, B.S.	13,318	357½	72½	27	10,600	Nicolaieff	1898	1896	16	3	16	12	16	4 12-in., 8 6-in., 4 4-7-in., 50 smaller Q.F. & M.	6	18-0	1006 582

† And liquid fuel, 580 tons.

‡ And liquid fuel.

RUSSIA.—Cruising Ships, &c. (B.S., Black Sea Fleet.)

Class.	NAME.	Displacement.	Length.	Beam.	Draft.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.	Speed.	Coal.	Complement.
											Deck.	Gun Position.				
<i>log.b.</i>	Abrek . . .	535	212½	24½	9	4506	Abo . .	1896	1897	53,600	1 in.	..	2 3-in., 4 1-8-in. . .	2	tons.	..
2nd cl. <i>cr.</i>	Admiral Korniloff . . .	5800	351	48½	20	9000	St. Nazaire . .	1887	1889	296,000	2½	..	10 6-in., 6 1-8-in., 6 1-4-in., 5 l.	5	1100	425
3rd cl. <i>cr.</i>	Almaz . . .	3285	325	43½	17½	7500	St. Petersburg (Baltic) . .	1895	1903	..	2½	5-3½ K.S.	6 4-7-in., 8 1-8-in., 2 1-4-in., 3 m.	6	560	340
2nd cl. <i>cr.</i>	Askold . . .	5905	426½	49½	20½	24,000	Kiel . .	1900	1901	..	3	4	12 6-in., 12 3-in., 8 1-8-in., 2 1-4-in., 2 m.	6 (2 sub.)	720	500
"	Aurora . . .	6731	413½	55½	21	11,610	St. Petersburg (Galerney) . .	1900	1902	..	2½	..	8 6-in., 20 3-in., 8 1-4-in.	3	1100	422
<i>y.b.</i>	Bobr . . .	875	215½	35½	9	800	St. Petersburg (New Admiralty) . .	1907	1908	..	..	..	2 4-7-in., 4 12-pr., 3 m.	1	1400	170
2nd cl. <i>cr.</i>	Bogatyr . . .	6645	416½	54½	20½	20,300	Stettin . .	1901	1902	..	2	5	12 6-in., 12 3-in., 6 1-8-in., 2 1-4-in., 2 m.	4 (2 sub.)	720	580
<i>log.b.</i>	Captain Sacken, B.S. . .	742	210	24	8½	3400	Nicolaieff . .	1888	1889	40,700	..	..	7 4-7-in., 7 m.	3	1100	120
<i>g.v.</i>	Chernomorets, B.S. . .	1224	210	35	11	1500	Nicolaieff . .	1889	1891	40,000	..	..	2 8-in., 1 6-in., 7 Q.F. & M.	2	250	161
2nd cl. <i>cr.</i>	Diana . . .	6630	413½	55½	21	11,610	St. Petersburg (Galerney) . .	1899	1902	..	2½	..	10 6-in., 20 3-in., 8 1-4-in.	3	900	422
<i>y.v.</i>	Donets, B.S. . .	1224	210	35	11	1500	Nicolaieff . .	1887	1888	40,000	..	..	2 8-in., 1 6-in., 7 Q.F. & M.	2	1400	161
<i>y.b.</i>	Gilyak . . .	875	215½	35½	9	800	St. Petersburg (New Admiralty) . .	1906	1908	..	..	..	2 4-7-in., 4 12-pr., 3 m.	1	60	170
<i>log.b.</i>	Gritden, B.S. . .	400	192½	24½	7½	3500	Nicolaieff . .	1893	1894	66,600	..	..	2 1-8-in., 7 1-4-in., 10 m.	2	90	60
3rd cl. <i>cr.</i>	Jemchug . . .	3106	347½	41½	16	17,000	St. Petersburg (Nevsky) . .	1903	1904	..	2	..	8 4-7-in., 6 1-8-in., 2 1-4-in., 1 m.	3	600	340
2nd cl. <i>cr.</i>	Kagul, B.S. . .	6645	439	54½	20½	19,500	Nicolaieff . .	1903	1905	..	2½	5-3½ K.S.	4 8-in., 6 6-in., 12 3-in., 6 1-8-in. (Hotchkiss)	2 (2 sub.)	720	..
<i>log.b.</i>	Kazarsky, B.S. . .	400	190	24	8½	3500	Elbing . .	1890	1891	32,500	..	..	9 1-8-in. (Hotchkiss)	2	90	60
<i>y.b.</i>	Khivinetz . . .	1340	230	36	10½	1400	St. Petersburg (New Admiralty) . .	1904	1905	..	..	..	2 8-in., 8 3-in., 4 m.	..	..	200

RUSSIA.—Cruising Ships, &c.—continued. (B.S., Black Sea Fleet.)

Class.	NAME.	Displacement.	Length.	Beam.	Draft.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Armour.		Armament.		Speed.	Coal.	Complement.
										Deck.	Gun Position.	Guns.	Torpedo Tubes.			
<i>g.h.</i>	Koreiets . .	875	215½	35½	9	800	St. Petersburg (New Admiralty)	1906	1908	Ins.	..	2 4·7-in., 4 12-pr., 3 m.	1	knots. 12·0	60	170
<i>g.v.</i>	Kubanets, B.S. .	1224	210	35	11	1500 B.	Sebastopol .	1888	1889	..	..	2 8-in., 1 6-in., 7 q.r.	2	13·8 ½	250	161
<i>to.g.h.</i>	Lieutenant Ilyin .	714	230	24	8½	3500	St. Petersburg .	1887	1888	..	..	7 3-pr., 10 m.	5	20·1 ½	97	120
2nd cl. <i>cr.</i>	Oleg . . .	6675	439½	54½	20½	19,500 Nor.	St. Petersburg (New Admiralty)	1903	1904	2½	5-3½	12 6-in., 12 8-in., 6 1·8-in.	2 sub.	23·0	600	340
"	Otchakoff, B.S. .	6615	439	54½	20½	19,500 Nor.	Sebastopol .	1902	1905	2½	5-3½ K.S.	12 6-in., 12 8-in., 6 m.	2 sub.	23·0	720	..
3rd cl. <i>cr.</i>	Rynda . . .	3508	265½	46	16	3000	St. Petersburg	1885	1887	1½	..	4 6-in., 9 q.r., m., & 4 l.	1	14·8 ½	710	322
<i>g.h.</i>	Sivoutch . .	875	215½	35½	9	800	St. Petersburg (New Admiralty)	1906	1908	..	..	2 4·7-in., 4 12-pr., 3 m.	..	12·0	60	170
<i>corr.</i>	Strjelok . .	1343	206½	32½	14	1528	St. Petersburg.	1880	1881	..	..	3 6-in., 7 q.r., m., & 4 l.	..	13·0	250	172
<i>g.v.</i>	Teretz, B.S. .	1224	210	35	11	1500 B.	Sebastopol .	1888	1889	..	..	2 8-in., 1 6-in., 7 q.r. & m.	2	13·8 ½	250	161
"	Uralets, B.S. .	1224	210	35	11	1500 B.	Sebastopol .	1888	1890	..	..	2 8-in., 1 6-in., 7 q.r. & m.	2	13·8 ½	250	161
<i>cr.</i>	Vitiaz . . .	6875	414	52½	20½	20,000 B.	St. Petersburg (Galerny)	Bldg.	..	2½	5-3½ K.S.	12 6-in., 12 8-in., 8 1·8-in.	5 (2 sub.)	23·0	720	..
<i>to.g.h.</i>	Voevoda . .	400	192½	24½	7½	3600	Elbing . .	1892	1893	..	..	2 1·8-in., 7 1·4-in., 3 m.	2	22·0	90	87
<i>g.v.</i>	Zaporojets . .	1224	210	35	10	1500	Nicolaieff .	1887	1889	..	..	2 8-in., 1 6-in., 7 q.r. & m.	2	13·5 ½	250	161

Okean, coal transport, 12,000 tons, 18 knots, launched at Kiel, 1901. Torpedo transports and mining vessels Volga, Bakan, Yenesei and Amur. Eight river gunboats (946 tons) for the Amur are in hand.

RUSSIA.—Auxiliary Steamers.

NAME.	Displacement.	Length.	Beam.	Draught.	Propellers.	Indicated Horse-Power.	Date of Launch.	Speed.
VOLUNTEER FLEET.	tons.	f. in.	f. in.	f. in.				knots.
Petersburg	9252				2		1894	19
Don (ex Fürst Bismarck)	8430				2	16,410	1890	19
Kiev	10,500	440 0	49 6	24 0	2	3200	1895	13
Kuban (ex Auguste Victoria)	8480				2	12,000	1889	13½
Lena (ex Kherson)	10,225				2	13,100	1898	13½
Nijni Novgorod	7876	325 0	40 0	23 6	1	2000	1891	11½
Smolensk	11,850				2		1901	20
Saratoff	8556	462 0	50 0	24 0	2	10,000	1892	19
Tamboff	8640	385 0	45 0	24 6	1	2,500	1893	12½
Terek (ex Columbia)	7241				2	13,680	1889	18½
Vladimir	10,500	440 0	49 6	24 0	2	3,200	1895	12
Voronej	10,500	440 0	49 6	24 0	2	3,200	1895	12
Yaroslav	8640	385 0	45 0	24 6	1	2,500	1893	12½

The vessels of the Black Sea Shipping Company are available for transport purposes.

SPAIN.—Armoured Ships.

NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.					Armament.		Speed.	Coal.	Complement.	
										Batt.	Deck.	Slide above Belt.	Bulkhead.	Heavy Guns.	Gun Position.	Second-ary.				Guns.	Torpedo Tubes.
c. Cataluña .	6889 tons.	347½ ft.	61 ft.	21½ ft.	15,000	Cartagena	1900	..	£ 600,000	12-10	2	in. 12	in. 10½	in. ..	2 11-in., 10 5·5-in., 2 2·7-in., 4 2·2-in., 4 1·4-in., 2 M.	5 sub.	knots. 20·0	tons. 1200	484	
c. Emperador Carlos V	9089	380	67	25	18,500	Cadiz (Vea Murguia)	1895	1898	734,000	2	6½-2	2	..	10	2	2 11-in. (Hontoria), 8 5·5-in., 4 3·9-in., 2 2·7-in., 4 2·2-in., 6 M.	6	20·0	1200	535
r. Numancia	7190	314½	55½	25½	3708	La Seyne	1863	1865	315,600	5½	..	4½	..	5	4½	4 8-in., 4 6·2-in., 10 5·9-in.	2	8·0	1100	600
b. Pelayo	9744	330	66	25	9000 Nic.	La Seyne	1887	1890	..	17½	4	..	..	19½	4 H.S.	2 12·5-in., 2 11-in., 9 5·5-in., 6 smaller, 12 M.	7	16·0	800	600
c. Princesa de Asturias	6889	347½	61	21½	15,000	Carraca	1896	..	600,000	12-10	2	..	12	10½	..	2 11-in., 10 5·5-in., 2 2·7-in., 4 2·2-in., 4 1·4-in., 2 M.	5	20·0	1200	500
b. 3 Battleships	14,760	..	..	..	..	Ferrol	Pro.	..	..	9-4	..	7	..	10	7	8 12-in., 20 4-in.	..	19·5	..	..

SPAIN.—Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draft.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Armour.		Armament.		Speed.	Coal.	Complement.
										Deck.	Gun Position.	Guns.	Torpedo Tubes.			
<i>to.g.b.</i>	Don Alvaro de Bazán	810	233	26½	22	2500	Ferrol	1897	1899	2	..	2 4.7-in. (Hontoria), 4 1.6-in., 2 m.	4	19.0	..	110
"	Dña María de Molina	810	233	26½	22	2500	Ferrol	1896	1898	..	..	..	..	..	..	..
<i>cr.</i>	Extremadura	2030	290	36	14	7000 T.	Cádiz	1900	1902	2	..	8 4-in. (Vickers), 4 3.2-in., 2 1.4-in., 1 l.	..	20.0	..	..
"	Lepanto	4750	318½	50½	20	12,000	Cartagena	1892	1895	4½	..	4 7.8-in. (Hontoria), 6 4.7-in., 6 6-pr., 4 3-pr., 5 m.	5	20.0	1100	276
<i>to.g.b.</i>	Marqués de la Victoria	810	233	26½	22	2500	Ferrol	1897	1900	..	..	2 4.7-in. (Hontoria), 4 1.6-in., 2 m.	4	19.0	..	110
<i>g.v.</i>	Marqués de Molins	562	190	23	10½	2600	Ferrol	1891	1898	..	..	2 4.7-in. (Hontoria), 4 3.2-in., 1 m.	2	12.0	106	80
"	Martin Alonso Pinzón	562	190	23	10½	2600	Ferrol	1892	1893	..	..	..	..	..	..	..
<i>cr.</i>	Reina Regente	5287	337	529	19½	6500 W.T.	Ferrol	1906	..	..	3	10 5.5-in., 12 3.2-in., 2 l., 8 m.	3	20.0	..	..
"	Rio de la Plata	1773	246	35½	15	7100 N.S.	Havre	1898	1899	..	1	2 5.5-in., 4 3.2-in., 4 3.2-in., 6 m.	2	20.0	270	213
<i>g.v.</i>	Vincente Yáñez Pinzón	562	190	23	10½	2600	Ferrol	1891	1892	..	..	2 4.7-in. (Hontoria), 4 3.2-in., 1 m.	2	12.0	106	80
<i>g.b.</i>	Four	1800	..	..	..	..	Cartagena	Pro.	..	..	..	4 3-in., 2 m.	..	13.0	..	..

Hernán Cortés, Vasco Núñez de Balboa, Ponce de León, MacMahon, Perla, Destructor, Nueva España and Temerario, gunboats.

SWEDEN.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draft.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cast.	Armour.						Armament.		Coal.	Complement.	
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position.		Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	Gun.	Second.			in.	sub.	knots.	tons.
c.d.s., t.	Aeran	3612	287	49½	16½	6500 Y.	Gothenburg	1901	1902	..	7 K.S.	1½	..	..	7½ K.S.	5 K.S.	..	2	2 8-2-in., 6 5-9-in., 10 2-2-in., 2 1-4-in., 2 M.	17-2 370	250
"	Dristigheten	3445	285	48½	16	5400 Y	Gothenburg	1900	1901	..	8 K.S.	1½	..	..	8 N.S.	3½ K.S.	..	2	2 8-2-in., 6 5-9-in., 10 2-2-in., 2 M.	16-5 300	250
a.c.	Fylgia	4100	377½	48½	16	12,440 Y. t.	Stockholm	1905	1907	385,700	4 K.S.	2	..	..	5 K.S.	..	..	2	8 5-9-in., 14 2-2-in., 3 1-4-in.	22-5 900	321
c.d.s., t.	Göta	3238	256½	48	16½	4750	Gothenburg	1890	1891	..	11½-8	2	..	..	7½ H.S.	5 H.S.	..	3	2 10-in., 4 6-in., 5 2-2-in., 8 M.	16-0 240	150
"	Manligheten	3612	287	49½	16½	7400 Y.	Malmö	1904	..	..	7 K.S.	1½	..	..	7½ K.S.	5 K.S.	..	2	2 8-2-in., 6 5-9-in., 10 2-2-in., 2 1-4-in., 2 M.	17-0 370	250
"	Njord	3445	278½	48½	17½	5350	Gothenburg	1898	1899	..	9½ H.N.S.	1½	..	..	9½ H.N.S.	3½ H.N.S.	..	1	2 9-8-in., 6 4-7-in., 10 2-2-in., 4 M.	16-5 275	200
"	Oden.	3445	278½	48½	17½	5330	Stockholm	1896	1898	..	9½ H.N.S.	1½	..	..	9½ H.N.S.	3½ H.N.S.	..	1	2 9-8-in., 4 4-7-in., 10 2-2-in., 4 M.	16-5 275	200
"	Oskar II.	4203	313½	49½	16½	8500 Y.	Gothenburg	1905	1907	..	6 K.S.	2	6 K.S.	6 K.S.	7½ K.S.	5 K.S.	..	2	2 8-2-in., 8 5-9-in., 10 2-2-in., 2 1-4-in., 2 M.	18-0 350	326
"	Svea	3051	248½	49½	17	3640	Gothenburg	1886	1887	..	11½-8	2	..	..	11½	..	..	1	2 10-in. (A.), 4 4-7-in., 6 2-2-in., 8 M.	14-7 220	268
"	Tapperheten	3612	287½	49½	16½	6000 Y.	Malmö	1901	1904	..	7 K.S.	1½	..	..	7½ K.S.	5 K.S.	..	2	2 8-2-in., 6 5-9-in., 10 2-2-in., 2 1-4-in., 2 M.	16-5 370	250
"	Thor.	3445	278½	48½	17½	5350	Stockholm	1898	1899	..	9½ H.N.S.	1½	..	..	9½ H.N.S.	3½ H.N.S.	..	1	2 9-8-in., 6 4-7-in., 10 2-2-in., 4 M.	16-5 275	200
"	Thule	3248	260½	48	16½	4740	Stockholm	1892	1894	..	11½-8	1½	..	..	11½	..	..	2	2 10-in. (A.), 4 6-in., 5 2-2-in., 8 M.	16-2 250	165
"	Wasa	3612	287	49½	16½	6000 Y.	Stockholm	1901	1893	..	7 K.S.	1½	..	..	7½ K.S.	5 K.S.	..	2	2 8-2-in., 6 5-9-in., 10 2-2-in., 2 1-4-in., 2 M.	16-5 370	250
"	2 Unnamed.	7500	..	..	..	17,500 Y.	..	Pro.	..	..	8	..	..	..	..	..	..	sub.	4 11-in., 4 7-6-in., 11 4-in., 4 1-pr.	21-0 800	450

The old coast-defence ships John Ericsson, Thordön, and Tyrking, 1500 tons, Lake, 1600 tons, and the armoured gunboats Berserk, Björn, Folke, Gerda, Hildur, Sölve and Ulf, 460 tons. Some of these are being partially modernized.

SWEDEN.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draft.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed. Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.		
<i>to.g.b.</i>	Class Horn	787	222	27	10½	3600	Stockholm	1899	1900	..	..	..	2 4·7-in., 4 2·2-in.	1 sub.	knots. tons. 20·0 ..	100
"	Class Uggla	787	232	27½	8½	4500 Y.	Stockholm	1900	1901	..	..	..	2 4·7-in., 4 2·2-in.	1	20·5 ..	100
<i>g.v.</i>	Edda	549	183½	27	10½	960	Carlakrona	1885	1886	..	..	..	1 10·6-in., 1 6-in., 2 1·5-in., 2 m.	..	13·6 t	80 76
<i>to.g.b.</i>	Jacob Bagge Örnen	787	222	27	10½	3970 4100	Malmö Gothenburg	1898 1896	1899 1897	..	..	..	2 4·7-in., 4 2·2-in.	1 sub.	19·5 19·5	100
"	Pallander	787	232	27½	8½	4500 Y.	Stockholm	1900	1901	..	..	..	2 4·7-in., 4 2·2-in.	1 sub.	20·5 t	100

Four gunboats of 190 to 200 tons, and about 130 I.H.P. each, and carrying 1 5-in. B.L.R. and 2 m.

TURKEY.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.					Armament.		Speed.	Coal.	Complement.	
											Belt.	Deck.	Side above Belt.	Bulkhead.	Heavy Guns.	Gun Position.	Gunn.				Top-edges.
c.b.	Assar-i-Tewfik*	4613 tons.	272½ ft.	52½ ft.	25 ft.	3560	La Seyne	1868	1870	..	in.	8	in.	..	in.	6	in.	3 5.9-in., 7 4.7-in., 6 6-pr.	knobs. 13.0	400	..
"	Messoudieh	9120 tons.	331½ ft.	59 ft.	25½ ft.	11,000 Nic.	Thames Genoa	1874	1876	..	12	1	12	..	6.9	12	2 9.2-in., 12 6-in., 14 3-in., 10 6-pr., 2 3-pr., 2 l.	17.5 kts	600	..	

* Refitted at Kiel, 1906.

TURKEY.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Gun.	Torpedo Tubes.			
cr.	Abdul Hamid	3800 tons.	340 ft.	47½ ft.	16 ft.	12,500 Nic.	Elswick	1903	1904	£	in. 4-1½	in.	2 6-in., 8 4.7-in., 6 1.8-in., 6 m.	2	knobs. 22.2	600	300
to. cr.	Berk-i-Satvet	740 tons.	262½ ft.	27½ ft.	..	5100	Kiel (Germania)	1906	1907	..	..	..	2 4-in., 6 6-pr., 2 m., 2 l.	3	22 kts	240	..
"	Heibetnuma	1960 tons.	226 ft.	37 ft.	14 ft.	2500 ind.	Turkey	1890	1893	..	..	..	3 5.9-in. (K.), 6 4.7-in., 6 Q.F.	2	14.0	..	..
g.v.	Lutfi-Hamayoun	1913 tons.	210 ft.	35 ft.	14 ft.	2800	Turkey	1892	1894	..	..	..	4 6-in. (K.), 6 4.7-in., 6 Q.F.	2	13.0	..	..
"	Abdul Medjid	3432 tons.	331½ ft.	42 ft.	16 ft.	12,000 Nic.	Philadelphia	1903	1904	..	4-1½	..	2 6-in., 8 4.7-in., 6 1.8-in., 6 m.	2	22.2	600	300
to. cr.	Feik-i-Shewket	740 tons.	262½ ft.	27½ ft.	..	5100	Kiel (Germania)	1906	1907	..	..	..	2 4-in., 6 6-pr., 2 m., 2 l.	3	22	240	..
"	Pelenk-i-deria	840 tons.	236½ ft.	31 ft.	16½ ft.	5000	Gaarden	1890	1891	..	..	½	2 4-in. (K.), 16 m.	2	20.0	..	111
g.v.	Sedul Bahr	800 tons.	173½ ft.	26½ ft.	11½ ft.	160	Turkey	1894	1897	..	2	..	4 4.7-in. (K.), 6 m.	2	12.7	120	..
to. g.b.	Shahani-deria	450 tons.	200 ft.	23 ft.	9 ft.	3000	Turkey	1892	1894	..	..	..	2 4.7-in. (K.), 6 m.	4	22.0	..	..
g.v.	Zuhaf	800 tons.	173½ ft.	26½ ft.	11½ ft.	160	Turkey	1894	1896	..	..	..	4 4.7-in. (K.), 6 m.	2	12.7	120	..

Despatch vessel Mermers (450 tons) launched 1907.

UNITED STATES.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Cost. *	Armour.				Armament.		Speed.	Coal.	Complement.			
										Belt.	Deck.	Side above belt.	Bulkhead.	Gun Position.	Heavy Guns.				Second ary.	Guns.	
t.	Alabama.	11,565 368	ft.	72½	26	11,207 t	Philadelphia	1898	1900	544,539	16½-4	2½-4	in. 5½	in. 12	in. 15	in. 6	4 13-in., 14 6-in., 12 6-pr., 11 1-pr., 4 M., 2 L.	1	800 17-0 t	592 1275	
c.s., t. (1 t.)	Arkansas	3235 252	50	12½	1739 T.	Newport	News	1900	1902	197,267	11-5	1½	..	..	11	..	2 12-in., 4 4-in., 3 6-pr., 6 1-pr., 2 M.	..	12-0	400
a. c.	Brooklyn.	9215 400½	62	26½	18,425	Philadelphia	1895	1896	613,583	3	6-3	4	..	8	5½	8 8-in., 12 5-in., 12 6-pr., 4 1-pr., 4 M., 2 L.	..	22-2	900	718	
"	California	13,680 502	69½	24½	23,000 B. & W.	S. Francisco.	1904	1907	756,000	6-3½	4	5	4	6	5	4 8-in., 14 6-in., 18 3-in., 12 3-pr., 8 1-pr., 8 M., 2 L.	2	22-0	900	829	
"	Charleston	9700 424	66	25½	27,200 B. & W.	Newport	News	1904	1906	563,030	4	3	4	..	4	..	14 6-in., 18 3-in., 12 3-pr., 12 1-pr., 10 M., 2 L.	..	22-0	650	664
"	Colorado.	13,680 502	69½	24½	26,837	Philadelphia	1903	1905	756,000	6-3½	4	5	4	6	5	4 8-in., 14 6-in., 18 3-in., 12 3-pr., 8 1-pr., 8 M., 2 L.	2	22-2	900	829	
t.	Connecticut	16,000 450	76½	26½	20,525 B. & W.	Camden, N.J.	1904	1906	819,300	11½	3	8	7	10	7	4 12-in., 8 8-in., 12 7-in., 20 3-in., 12 3-pr., 8 1-pr., 8 M., 2 L.	4	18-8	900	803	
t.	Delaware	20,000 510	85½	27	26,000	Newport	News	1909	..	817,300	11	..	10	..	11	5	10 12-in., 14 5-in., 4 3-pr., 2 L., 3 M.	2	21-0	1000	..
t.	Florida	20,000 510	85½	27	..	New York	Mag.	11	..	10	..	11	5	10 12-in., 14 5-in., 4 3-pr., 2 L., 3 M.	2	21-0	1000	..
Super- posed turrets.	Georgia	14,948 435	76½	23½	19,000 Nic.	Bath, Me.	1904	1906	737,700	11-4	3	6	6	11	6	4 12-in., 8 8-in., 12 6-in., 12 3-in., 12 3-pr., 8 1-pr., 8 M., 2 L.	4	19-2	900	812	
b.	Idaho	13,000 375	77	25	10,000 B. & W.	Philadelphia	1905	1909	616,360	9-4	3-1½	7	7	10-7½	6	4 12-in., 8 8-in., 8 7-in., 12 3-in., 6 3-pr., 4 1-pr., 8 M., 2 L.	2	17-0	600	725	
t.	Illinois	11,565 368	72½	26	12,757	Newport	News	1898	1901	533,287	16½-4	2½-4	5½	12	15	6	4 13-in., 14 6-in., 16 6-pr., 6 1-pr., 4 M., 2 L.	1	17-45	800	686
b.	Indiana	10,288 348	69½	27½	9,607 B. & W.	Philadelphia	1893	1895	620,569	18	2½	5	17	17	10	4 13-in., 8 8-in., 4 6-in., 20 6-pr., 6 1-pr., 2 M., 1 c.	1	15-5	400	497	
"	Iowa	11,340 360	72½	26½	11,933	Philadelphia	1896	1897	618,514	14	2½	5	12	15	8-6	4 12-in., 8 8-in., 6 4-in., 20 6-pr., 4 1-pr., 4 M., 2 L.	4	17-1	625	520	
t.	Kansas	16,000 450	77	26½	16,500 B. & W.	Camden, N.J.	1905	1906	855,850	8-11	3-4½	8	7	10	7	4 12-in., 8 8-in., 12 7-in., 20 3-in., 12 3-pr., 8 1-pr., 8 M., 2 L.	4	18-1	900	854	

* The sums given in this column are exclusive of the cost of armour and armament according to the system of making appropriations in the estimates. † Mean draught.

UNITED STATES.—Armoured Ships—continued.

Class.	NAME.	Displacement. tons.	Length. ft.	Beam. ft.	Draft. ft.	Indicated Horse- Power.	Where Built.	Date of Launch.	Cost. \$	Armour.				Armament.		Speed. knots.	Normal Coal Supply. tons.	(Complement.
										Belt.	Deck.	Slide above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Second- ary.			
super- powered torpedo	Kearsarge Kentucky	11,540 368	72½	25½	25½	11,788 { 12,179 }	Newport News	1898 1900	462,345 each	in.	in.	5½ H.S.	..	in.	in.	4 13-in., 4 8-in., 14 5-in., 20 6-pr., 8 1-pr., 4 m., 2 l.	1 { 16-8 } 16-9 f	410 (686) 1691
l.	Louisiana	16,000 450	76½	26½	26½	20,500 B. & W.	Newport News	1904 1906	819,300	11-8 K.S.	3	8 K.S.	7 K.S.	10 K.S.	7	4 12-in., 8 8-in., 12 7-in., 20 3-in., 12 3-pr., 8 1-pr., 8 m., 2 l.	4 18-8 f	900 803
"	Maine	12,300 388	72½	25½	25½	15,693 Nic.	Philadelphia	1901 1902	592,828	11-4 K.S.	2½-4	6 K.S.	10 K.S.	12 K.S.	6	4 12-in., 16 6-in., 6 3-in., 8 3-pr., 6 1-pr., 2 m., 2 l.	2 18-0 f	1000 551
a.c.	Maryland	13,680 502	69½	24½	24½	28,059 B. & W.	Newport News	1903 1905	756,400	6-3½ K.S.	4	5 K.S.	4 K.S.	6 K.S.	5	4 8-in., 14 6-in., 18 3-in., 12 3-pr., 8 1-pr., 8 m., 2 l.	sub. f	1800
b.	Massachusetts	10,288 348	69½	27½	27½	10,240 B. & W.	Philadelphia	1898 1896	620,569	18 H.S.	2½	5 H.S.	17 H.S.	17 H.S.	10-5	4 13-in., 8 8-in., 4 6-in., 20 6-pr., 8 1-pr., 2 m., 2 l.	sub. f	1850
"	Michigan	16,000 450	80½	24½	24½	16,000 B. & W.	Camden, N.J.	1908 ..	700,000	12-9 H.S.	3	8 H.S.	10 H.S.	12-8 H.S.	8	8 12-in., 22 3-in., and smaller.	..	900 669
a.c.	Milwaukee	9700 424	66	25½	25½	21,000 W.T.	S. Francisco.	1904 1906	580,500	4 H.N.S.	3	4 H.N.S.	..	4 H.N.S.	..	14 6-in., 18 14-pr., 12 3-pr., 12 1-pr., 10 m., 2 l.	..	650 664
l.	Minnesota	16,000 450	77	26½	26½	16,500 B. & W.	Newport News	1905 1906	844,500	8-11 K.S.	3-½	8 K.S.	7 K.S.	10 K.S.	7	4 12-in., 8 8-in., 12 7-in., 20 3-in., 12 3-pr., 8 1-pr., 8 m., 2 l.	sub. f	900 881
b.	Mississippi	13,000 375	77	24½	24½	10,000 B. & W.	Philadelphia	1905 1909	616,360	9-4 K.S.	3-1½	7 K.S.	7 K.S.	10-7½ K.S.	6	4 12-in., 8 8-in., 8 7-in., 12 3-in., 6 3-pr., 4 1-pr., 8 m., 2 l.	sub. f	600 725
l.	Missouri	12,300 388	72½	25½	25½	15,845 T.	Newport News	1901 1903	592,828	12-4 K.S.	2½-4	6 K.S.	10 K.S.	12 K.S.	6	4 12-in., 16 6-in., 6 3-in., 8 3-pr., 4 1-pr., 2 m., 2 l.	sub. f	1000 551
a.c.	Montana	14,500 502	72½	25	25	25,000 B. & W.	Newport News	1906 1908	970,630½	5-3 K.S.	3	5 K.S.	6 K.S.	9 K.S.	5	4 10-in., 16 6-in., 22 3-in., 12 3-pr., 4 1-pr., 4 m., 2 l.	sub. f	900 845
a.c. & t.	Monterey	4084 256	59	15½	15½	5244 B. & W.	S. Francisco.	1891 1893	345,731	13-6 H.S.	3	..	..	13 H.S.	..	2 12-in., 2 10-in., 6 6-pr., 4 1-pr., 2 m.	..	200 218
Super- powered torpedo	Nebraska	14,948 435	76½	23½	23½	19,000 B. & W.	Seattle.	1904 1906	767,210	11-4 K.S.	3	6 K.S.	6 K.S.	11 K.S.	6	4 12-in., 8 8-in., 12 6-in., 12 3-in., 12 3-pr., 8 1-pr., 8 m., 2 l.	sub. f	900 812
a.c. & t. (1 t.)	Nevada	3714 252	50	12½	12½	2,400 Nic.	Bath, Me.	1900 1903	197,267	11-5 H.S.	1½	..	..	11 H.S.	..	2 12-in., 4 4-in., 3 6-pr., 6 1-pr., 2 m.	..	338 222

<i>t.</i>	<i>Super- posed battleship</i>	<i>t.</i>	New Hampshire	16,000 450	77	26½	16,500 B. & W.	Camden, N.J.	1906	1908	1,600,000 (Total)	9-4	3	7	7	12	7	4	12-in., 8 8-in., 12 7-in., 12 3-in., 12 5-pr., 4 1-pr., 4 m., 2 l.	4	18-0	900	916
		<i>t.</i>	New Jersey	11,948 435	76½	23½	19,000 B. & W.	Quincy, Mass.	1904	1905	699,680	11-4	3	6	6	11	6	4	12-in., 8 8-in., 12 6-in., 12 3-in., 12 5-pr., 8 1-pr., 8 m., 2 l.	4	19-4	900	812
		<i>a.c.</i>	New York	8200 380½	64½	27½	17,075 B. & W.	Philadelphia	1891	1893	613,377	4	6-3	..	..	10	5-½	4	8-in., 10 5-in., 8 6-pr., 2 1-pr., 4 m., 2 l.	2	21-0	750	498
		<i>a.c.</i>	North Carolina	14,500 502	72½	25	25,000 B. & W.	Newport	1906	1908	970,630†	5-3	3	5	9	9	5	4	10-in., 16 6-in., 22 3-in., 12 3-pr., 4 1-pr., 4 m., 2 l.	4	22-4½	900	845
		<i>b.</i>	North Dakota	20,000 510	85	27	26,000 tur.	Quincy, Mass.	1908	..	899,500	11	..	10	11	11	5	10	12-in., 14 5-in., 4 3-pr., 2 l., 4 1-pr., 4 m., 2 l.	2	21-0	1000	..
		<i>t.</i>	Ohio	12,440 388	72½	25½	16,220 T.	S. Francisco.	1901	1904	595,705	11-4	3-4	6	10	12	6	4	12-in., 16 6-in., 6 3-in., 8 3-pr., 6 1-pr., 2 m., 2 l.	2	17-8	1000	521
		<i>b.</i>	Oregon	10,288 348	69½	27½	11,033 Nic.	S. Francisco.	1893	1896	653,447	18	2½	5	17	17	10-5	4	13-in., 8 8-in., 4 6-in., 20 6-pr., 4 1-pr., 4 m., 1 l.	3	16-8	400	500
		<i>a.c.</i>	Pennsylvania	13,680 502	69½	24½	23,600 Nic.	Philadelphia	1903	1905	799,340	6-3½	4	5	4	6	5	4	8-in., 14 6-in., 18 3-in., 12 3-pr., 8 1-pr., 8 m., 2 l.	2	22-4	900	829
		<i>a.d.a. (2 t.)</i>	Puritan	6060 290½	60	18½	3,700 B. & W.	Chester	1892	1896	..	14-6	2	..	..	14	..	4	12-in., 6 4-in., 6 6-pr., 2 1-pr., 4 m.	..	12-4	307	230
		<i>Super- posed a.c.</i>	Rhode Island	14,948 435	76½	23½	19,000 B. & W.	Quincy, Mass.	1904	1905	699,680	11-4	3	6	6	11	6	4	12-in., 8 8-in., 12 6-in., 12 3-in., 12 5-pr., 8 1-pr., 8 m., 2 l.	4	19-0	900	812
		<i>b.</i>	St. Louis	9700 424	66	25½	21,000 B. & W.	Philadelphia (Cramp)	1905	1906	563,030	4	3	4-3	..	4	..	14	6-in., 18 14-pr., 12 5-pr., 12 1- pr., 10 m., 2 l.	22-3	650	664	
			South Carolina	16,000 450	80½	24½	16,000 B. & W.	Philadelphia (Cramp)	1908	..	700,000	12-9	3	8	10	12-8	8	8	12-in., 22 3-in. and smaller	2	18-5	1500	669
		<i>a.c.</i>	South Dakota	13,680 502	69½	24½	23,000 B. & W.	S. Francisco.	1904	1907	770,570	6-3½	4	5	4	6	5	4	8-in., 14 6-in., 18 3-in., 12 3-pr., 8 1-pr., 8 m., 2 l.	2	22-0	900	829
		"	Tennessee	14,500 502	72½	25	23,000 B. & W.	Philadelphia	1904	1906	970,630†	5-3	3	5	6	9	5	4	10-in., 16 6-in., 22 3-in., 12 3-pr., 4 1-pr., 8 m., 2 l.	4	22-1	900	858
		<i>t.</i>	Utah	22,000 510	85½	27	..	Camden, N.J.	1906	..	..	11	..	10	..	11	5	10	12-in., 14 5-in., 4 3-pr., 2 l., 3 m., 2 1-pr.	2	21-0	1000	..
		<i>t.</i>	Vermont	16,000 450	77	26½	16,500 B. & W.	Quincy, Mass.	1905	1906	858,730	8-11	3-4½	8	7	10	7	4	12-in., 8 8-in., 12 7-in., 20 3-in., 12 5-pr., 8 1-pr., 8 m., 2 l.	4	18-33	900	854
		<i>Super- posed a.c.</i>	Virginia	14,948 435	76½	23½	19,000 Nic.	Newport	1904	1905	737,700	11-8	3	6	6	11	6	4	12-in., 8 8-in., 12 6-in., 12 3-in., 12 5-pr., 8 1-pr., 8 m., 2 l.	4	19-0	900	812
			Washington	14,500 502	72½	27	25,000 B. & W.	Camden, N.J.	1905	1906	970,630†	5-3	3	5	6	9	5	4	10-in., 16 6-in., 22 3-in., 12 3-pr., 4 1-pr., 8 m., 2 l.	4	22-8	900	858
		"	West Virginia	13,680 502	69½	24½	26,135 B. & W.	Newport	1903	1905	798,310	6-3½	4	5	12	6	5	4	8-in., 14 6-in., 18 3-in., 12 3-pr., 8 1-pr., 8 m., 2 l.	2	22-1	900	829
		<i>t.</i>	Wisconsin	11,653 368	72½	26	12,452 B. & W.	S. Francisco.	1898	1901	549,666	16½-4	3-4	5½	..	15	6	4	13-in., 14 6-in., 16 6-pr., 6 1-pr., 4 m., 2 l.	1	17-1	800	583
		<i>a.d.a. (1 t.)</i>	Wyoming	3218 252	50	12½	2,451 B. & W.	S. Francisco.	1900	1903	200,350	11-5	1½	..	..	11	..	2	12-in., 4 4-in., 3 6-pr., 6 1-pr., 2 m.	..	12-4	881	222
		<i>b.</i>	Two Battleships	26,000 ..	..	..	..	..	Pro.	..	..	11	..	10	..	11	5	12	12-in.	..	21-0	..	..

* See note on page 217.

† Mean draught.

Also the monitors Amphitrite, Mantononah, Monitor, and Terror (3990 tons), Tallahassee (ex-Florida), 3235 tons, and the ram Katabdin (2155 tons). ‡ Including armour, but not armament.

UNITED STATES.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Cost.	Armour.	Armament.		Speed.	Normal Coal Supply.	Complement.	
		tons.	ft.	ft.	ft.				\$	Deck.	Gun Position.	Guns.	Torpedo Tubes.			
3rd cl.cr.	Albany	3487	345	43 $\frac{3}{4}$	20	7500	Elswick	1899	247,611	in. 3	in. 3-1 $\frac{1}{4}$ shields	10 5-in., 10 3-pr., 12 1-pr., 2 m., 1 l.	..	tons. 512	356	
cr.	Bennington	1710	230	36	16 $\frac{1}{2}$	3392	Chester	1890	100,894	$\frac{1}{2}$	..	6 6-in., 4 6-pr., 4 1-pr., 4 m.	..	$\frac{t}{t}$ 17.5	747
scout.	Birmingham	3750	420	46 $\frac{3}{4}$	17	16,000 Express	Quincy, Mass.	1907	301,000	2-1 $\frac{1}{2}$	..	2 5-in., 6 3-in. . .	2	$\frac{t}{t}$ 24.3	403
cr.	Boston	3000	271 $\frac{1}{2}$	42 $\frac{1}{2}$	20 $\frac{1}{2}$	4030	Chester	1884	127,196	1 $\frac{1}{2}$	..	2 8-in., 6 6-in., 6 6-pr., 4 1-pr., 2 m., 1 l.	sub.	$\frac{t}{t}$ 15.6	380
													..	$\frac{t}{t}$ 456	282	
g.v.	Castine	1177	204	32	14 $\frac{1}{2}$	2199	Bath, Me.	1892	65,450	$\frac{1}{2}$	..	8 4-in., 4 6-pr., 2 1-pr., 1 m.	..	$\frac{t}{t}$ 16.0	125
														$\frac{t}{t}$ 292	151	
cr.	Chattanooga	3200	292	44	16 $\frac{3}{4}$	5303 B.&W.	Elizabeth Port	1903	212,325	2	..	10 5-in., 8 6-pr., 2 1-pr., 4 m., 1 l.	..	$\frac{t}{t}$ 16.65	470	
scout.	Chester	3750	420	46 $\frac{3}{4}$	17	16,000 Nor. turb.	Bath, Me.	1907	337,000	2-1 $\frac{1}{2}$	..	2 5-in., 6 3-in. . .	2	$\frac{t}{t}$ 24.0 $\frac{1}{2}$	700
3rd cl.cr.	Chicago	5273	325	48 $\frac{1}{2}$	22 $\frac{1}{2}$	9000 C. & B.&W.	Chester	1885	182,677	1 $\frac{1}{2}$	4 shield	4 8-in., 14 5-in., 9 6-pr., 2 1-pr., 2 m., 1 l.	sub.	$\frac{t}{t}$ 18.0	1250	
"	Cincinnati	3213	300	42	20 $\frac{1}{4}$	8,490 B.&W.	Brooklyn	1892	226,055	2 $\frac{1}{2}$	4	11 5-in., 8 6-pr., 2 1-pr., 2 m.	..	$\frac{t}{t}$ 19.0	350	
cr.	Cleveland	3200	292	44	16 $\frac{3}{4}$	4640 B.&W.	Bath, Me.	1901	212,325	2	..	10 5-in., 8 6-pr., 2 1-pr., 4 m., 1 l.	..	$\frac{t}{t}$ 16.4	468	
2nd cl.cr.	Columbia	7375	412	58 $\frac{1}{2}$	25 $\frac{1}{2}$	18,509 B.&W.	Philadelphia	1892	559,950	4-2 $\frac{1}{2}$	4 shield	1 8-in., 2 6-in., 8 4-in., 12 6-pr., 2 1-pr., 2 m., 1 l.	..	$\frac{t}{t}$ 22.8	700	
g.v.	Concord	1710	230	36	16 $\frac{1}{2}$	3404	Chester	1890	100,894	$\frac{1}{2}$	..	6 6-in., 2 6-pr., 2 3-pr., 2 1-pr.	..	$\frac{t}{t}$ 16.8	1670
														$\frac{t}{t}$ 401	200	
3rd cl.cr.	Denver	3200	292	44	16 $\frac{3}{4}$	4135 B. & W.	{ Philadelphia Quincy, Mass.	1902	212,325	2	..	10 5-in., 8 6-pr., 2 1-pr., 4 m., 1 l.	..	$\frac{t}{t}$ 16.75	470	303
"	Des Moines															

3rd cl. cr.	Detroit	2089	257	37	16½	5207	1891	1892	..	..	10 5-in., 6 6-pr., 2 1-pr., 2 m., 1 l.	..	18	200	248
<i>g. v.</i>	Dolphin	1486	240	32	17	2255	Chester	1884	1885	64,728	2 4-in., 1 6-pr., 6 3-pr., 2 m.	..	15.5 t	340	117
"	Dubuque	1085	174	35	13	1193	Morris Heights N.Y.	1904	1905	..	6 4-in., 4 6-pr., 2 1-pr., 2 m.	..	12.9	200	162
<i>cr.</i>	Galveston	shd. 3200	292	44	16½	5073	Richmond, Va.	1903	1904	212,325	10 5-in., 8 6-pr., 2 1-pr., 4 m., 1 l.	..	16.4	470	302
<i>g. v.</i>	Helena	1392	250½	40	10	1988	Newport News	1896	1897	57,536	8 4-in., 4 6-pr., 4 1-pr., 2 m.	2½	15.5 t	700	256
3rd cl. cr.	Marblehead	2089	257	37	16½	5450	Boston	1892	1894	138,498	10 5-in., 6 6-pr., 2 1-pr., 2 m., 1 l.	..	18.9 t	200	248
<i>g. b.</i>	Marietta	1000	174	34	13½	1054	S. Francisco.	1896	1897	45,823	6 4-in., 4 6-pr., 2 1-pr., 1 m.	..	13.2 t	100	140
2nd cl. cr.	Minneapolis	7975	412	58½	25½	20,862	Philadelphia	1893	1894	552,754	1 8-in., 2 6-in., 8 4-in., 12 6-pr., 2 1-pr., 2 m., 1 l.	4 shield	23.0 t	239	477
<i>to. cr.</i>	Montgomery	2089	257	37	17	5584	Baltimore	1891	1894	125,860	4 6-pr. . . . .	..	18.8 t	200	257
<i>g. v.</i>	Nashville	1371	220	38	12	2536	Newport News	1895	1897	57,536	8 4-in., 4 6-pr., 2 1-pr., 2 m.	..	16.7 t	150	176
3rd cl. cr.	New Orleans	shd. 3487	346	43½	19½	7500	Elswick	1896	1898	293,684	10 5-in., 10 3-pr., 2 1-pr., 2 m., 1 l.	3-1½ shields	20.0 t	400	366
2nd cl. cr.	Olympia	5870	340	53	24½	17,313	S. Francisco.	1892	1895	369,054	4 8-in., 10 5-in., 14 6-pr., 4 1-pr., 2 m.	4-2½ shields	21.69 t	607	450
<i>g. v.</i>	Paducah	1085	174	35	13	1000	Morris Heights, N.Y.	1904	1905	..	6 4-in., 4 6-pr., 2 1-pr., 2 m.	..	12.0	200	162
"	Petrel	892	176½	31	13½	1045	Baltimore	1888	1889	50,755	4 6-in., 2 3-pr., 4 m. . . .	..	11.8 t	100	122
<i>g. b.</i>	Princeton	1000	168	36	12½	923	Camden	1897	1898	47,262	6 4-in., 4 6-pr., 2 1-pr., 1 m. . .	..	12.0	200	135
3rd cl. cr.	Raleigh	3213	300	42	20½	8500	Norfolk	1892	1894	226,055	11 5-in., 8 6-pr., 2 1-pr., 2 m., 1 l.	4	19.0	350	313
						B. & W.								460	

† 26-52 knots on trials.

* Prices exclusive of armament.

UNITED STATES.—Cruising Ships, &c.—continued.

Class.	NAME.	Displacement.	Length.	Beam.	Draft.	Indicated Horse Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Normal Coal Supply.	Complement.
											Deck.	Gun Position.	Gun.	Torpedo Tubes.			
<i>sloop</i>	Salem . .	tons. 3750	420	46½	18½	16,000 W.T. turb.	Quincy, Mass.	1907	1908	\$ 301,000	in. 2-1½	in. ..	2 5-in., 6 3-in.	2 sub.	knots. 25·9	tons. 1250	356
3rd cl. cr.	Tacoma . .	shd. 3200	292	44	16½	5288 B.& W.	S. Francisco.	1903	1904	212,325	..	2 shields	10 5-in., 8 6-pr., 2 1-pr., 4 m., 1 l.	..	16·6	470	302
<i>g. v.</i>	Vicksburg . .	1000	168	36	12½	1118	Bath, Me.	1896	1898	47,406	..	..	6 4-in., 4 6-pr., 2 1-pr., 1 m.	..	12·7	100	135
"	Wheeling . .	1000	174	34	12½	1080	S. Francisco.	1897	1897	65,540	..	..	6 4-in., 4 6-pr., 2 1-pr., 1 m.	..	12·9	120	140
"	Wilmington . .	1392	250½	40	10	1894	Newport News	1895	1897	57,536	1	2½	8 4-in., 4 6-pr., 4 1-pr., 4 m.	..	15·0	100	175
<i>cr.</i>	Yorktown . .	1710	230	36	16½	3392	Philadelphia	1888	1889	93,496	..	..	6 6-in., 2 6-pr., 2 3-pr., 4 1-pr., 2 m.	2	16·1	200	195
															£	380	

* Prices exclusive of armament.

Third class cruisers Baltimore and San Francisco have been converted into mine-layers. Colliers Prometheus and Vestal (12,585 tons).

Enrolled Auxiliary Cruisers of the United States Navy.

Class.	NAME.	Gross Tonnage.	Length.	Beam.	Depth.	Indicated Horse-Power.	Where Built.	When Built.	Owners.	Armament.	Speed.
1st	St. Louis .	. 11,629	535½	63	26½	18,000	Philadelphia	1895	International Navigation Co.	The armament comprises 6-in., 5-in., and 4-in. guns.	22.2
"	St. Paul .	. 11,629	535½	63	26½	18,000	"	1895	"		22.5
"	Paris .	. 10,794	517	63½	22	20,000	Clydebank, Scotland	1880	"		20.7
"	New York .	. 10,802	517	63½	22	20,000	"	1888	"		20.6
"	Philadelphia .	. 10,802	517	63½	22	20,000	"	1889	"		20.8
"	Corea .	. 11,200	..	..	..	..	"	1901	Pacific Mail Steamship Co.		18.0
"	Siberia .	. 11,200	..	..	..	..	"	1901	"		18.0

Converted Merchant Vessels Retained.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Cost.	Armament.	Speed.	Coal.	Complement.
cr.	Buffalo .	. 6888	380½	48	22	3600	Newport News	1893	£ 117,949	12 5-in., 6 6-pr., 4 4-in., 2 m.	knots. 14.5	tons. 100	297
"	Dirie .	. 6145	389½	48	19½	3800	Newport News	1893	117,949	8 5-in., 4 6-pr., 4 1-pr., 2 m.	16.0	1371	181
"	Prairie .	. 6872	390½	46½	22	3800	Philadelphia	1890	117,949	8 6-in., 6 6-pr., 4 3-pr., 4 1-pr., 2 m.	14.5	1000	295
"	Yankee .	. 6888	380½	48	22	3800	Newport News	1892	117,949	8 5-in., 6 6-pr., 2 1-pr., 2 m.	14.5	1000	292
"	Mayflower (yacht) .	. 2690	275	36	17½	4600	Clydebank	1896	88,359	....	16.8	584	160

The armament of the above vessels includes 4-in., 5-in., and 6-in. guns.

SHIPS BELONGING TO POWERS WHOSE NAVIES ARE OF LESSER IMPORTANCE.

Belgium.—Several steam vessels, between 419 and 684 tons principally employed as packets, under the orders of the Government. The *Ville d'Anvers*, 414 tons, for fishery protection.

Bulgaria.—Eleven steamers of small size, of which one is used as the Prince's yacht. Two armoured gunboats for the Danube completing at Leghorn. The *Nadiezda*, a despatch vessel (715 tons), launched at Bordeaux in 1898; speed, 18·85 knots; 2600 I.H.P.; Lagrafel-d'Allest boilers; armament, 2 3·9-in., 3 1·8-in. Q.F., and 2 torpedo tubes. Three 100-ton 26-knot torpedo boats launched 1907; three smaller.

Colombia.—The cruiser *Almirante Lezo* (*ex* *El Baschir*), of 1200 tons displacement; 2500 H.P.; speed, 18 knots; built in 1892, bought from Morocco, 1902. Two gunboats, *Chercuito*, 643 tons, and *Bogota*. Two river gunboats, *General Nerino* and *Esperanza*, 400 tons.

Ecuador.—Two old (1886) French despatch vessels, *Papin* and *Inconstant* (891 tons), built of wood and iron, were bought. One torpedo boat and two steam transport vessels.

Egypt.—The Nile stern-wheel gunboats *Sultan*, *Sheikh* and *Melik*, 140 tons, *Fateh* and *Naseh*, 128 tons; also the *Abu Klea*, *Hafr*, *Metemmeh*, and *Tamai*.

Hayti.—Steel gunboat—*Capois la Mort*, 260 tons, 13·9-in., and 4 1-pr. Q.F. Iron corvette—*Dessalines*, 1200 tons, armed with 1 3·9-in. Q.F., 2 3·9-in. B.L., 2 l., 2 m. Two sloops—*St. Michael* and 1804. Gun-vessel, 22nd of December.

Mexico.—Two gun-vessels, *Tampico* and *Vera Cruz*, launched at Elizabethport, New Jersey, September, 1902; displacement, 980 tons; armament, 4 4-in. Q.F., 6 6-pr.; bow torpedo tube; 2400 I.H.P.; speed, 16 knots; fitted to serve as transport for 200 troops. Gun-vessels *Bravo* and *Morero*, 1200 tons; 2600 I.H.P.; Blechynden boilers; 17 knots; launched at the Orlando Yard, Leghorn, 1904. The *Zaragoza*, built of steel, 1200 tons, 1300 H.P., 15 knots speed, and armed with 4 4·7-in. guns and 4 small quick-firing guns. Gun-vessel, *Democrata*, 450 tons; 11 knots; 2 6½-in. muzzle-loaders and 2 small guns. Torpedo transport *General Guerrero*, 1880 tons; 1200 I.H.P.; completed at Barrow 1908. Two small gunboats of 10 knots speed. Five torpedo boats.

Peru.—Almirante Grau, cruiser, 3200 tons; 370 ft. long, 40 ft. 6 in. beam, 14 ft. 3 in. draught; launched at Barrow, March, 1906; 2 6-in., 8 14-pr., 8 1½-pr.; 2 submerged torpedo-tubes; 1½-in. armoured deck, 3-in. conning tower; 14,000 I.H.P.; 24 knots. A sister vessel is in hand at the same yard. Eclairer, cruiser, 1769 tons, launched 1877, and partially reconstructed. Bought from France. Lima, built 1881, of 1700 tons displacement, 1800 I.H.P., 16 knots speed; armament, 2 6-in. B.L.R. guns. Screw steamer, Santa Rosa, of about 400 tons.

Roumania.—Elizabetha, protected cruiser (deck 3 in.), built in 1887 at Elswick; 230 ft. long, 32 ft. 10 in. beam; 1320 tons; 3000 I.H.P.; armament, 4 5·9-in. B.L.R., 4 Q.F., 2 M., 4 torpedo tubes. Composite gunboat Mircea, 360 tons; Grivitza, 110 tons. Two gunboats of 45 tons, and 3 first-class torpedo boats, these forming the sea division. For the Danube, the gunboats Fulgurul, Oltul, Siretul, Bistritza, 90 to 100 tons, the *torpilleur de barrage* Alexandru cel Bun (104 tons), 5 sloops, 2 small torpedo boats, and the paddle steamer Romania, 240 tons, repaired 1890. The shipbuilding programme includes 8 monitors of 600 tons, 12 torpedo-boats and 8 vedettes for the Danube, and 6 coast-defence vessels of 3500 tons, 4 destroyers of 300 tons, and 12 torpedo-boats for the Black Sea. Four of the monitors (3 4·7-in. guns) and 3 torpedo-boats have been completed.

Santo Domingo.—The Independencia, built in England 1894, 170 ft. long, 25 ft. broad, displacement 322 tons, and armed with seven Hotchkiss quick-firing guns. Restauracion, steel gun-vessel, 1000 tons, launched at Glasgow in 1896. The 14-knot cruiser Presidente has been reconstructed, and carries seven guns.

Sarawak.—Two gunboats, of 175 and 118 tons respectively, of low speed, each armed with two guns.

Siam.—Deck-protected cruiser, Maha Chakrkri, 290 ft. long, 39 ft. 4 in. beam, of 2500 tons displacement and 17 to 18 knots speed; armament, four 4·7-in. quick-firing guns, and ten 6-pr. quick-firing guns. Makut-Rajakamar, 650 tons. The gunboats Bali, Muratha, and Sugrib, 600 tons, one 4·7-in. Q.F., five 2·2 in., four 1·4 in., 12 knots, launched 1898 and 1901. Several other gunboats. Three modern despatch vessels 100 to 250 tons.

Uruguay.—Gunboats: General Artigas, 274 tons, 12½ knots speed, 2 4·7-in. (Krupp), 2 M.; and General Saurez, 300 tons. The Italian cruiser Dogali has been purchased.

Venezuela.—The gunboats Bolivar (571 tons, 18·6 knots) and Miranda (200 tons, 12 knots); transports Restaurador (568 tons) and Zamora (350 tons).

BRITISH AND FOREIGN TORPEDO-BOAT FLOTILLAS.

Great Britain.

Name or Number.	Built by.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Mean Speed on Trial, or expected.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity Tons.
			Length.	Beam.	Draught.								
			Feet.	Feet.	Feet.		Tons.		Knots.				
Great Britain.													
TORPEDO-BOAT													
DESTROYERS.													
† Ardent	Thornycroft ..	1894	201·6	19	7·3	2	265	4,500	27·97	1-12 pr. 5-6 prs.	2	45	60
Banshee	Laird	1894	210	19·5	..	2	290	4,400	27·97	1-12 pr. 3-6 prs.	2	50	..
† Boxer	Thornycroft ..	1894	201·6	19	7·3	2	265	4,500	27·17	1-12 pr. 5-6 prs.	2	45	60
† Bruizer .. ..	.. ..	1895	201·6	19	7·3	2	265	4,500	27·97	1-12 pr. 5-6 prs.	1	45	60
* Charger	Yarrow	1894	180	18·5	5·25	2	270	3,100	27·98	1-12 pr. 5-6 prs.	2	45	60
Conflict	White	1894	205·6	20	..	2	320	4,370	27·21	1-12 pr. 5-6 prs.	2	50	60
Contest	Laird	1894	210	19·5	..	2	290	4,400	27·4	1-12 pr. 3-6 prs.	1	50	60
† Daring	Thornycroft ..	1893	185	19	7	2	260	4,300	27·70	1-12 pr. 3-6 prs.	1	45	50
* Dasher	Yarrow	1894	190	18·5	5·25	2	255	3,182	26·21	1-12 pr. 5-6 prs.	2	45	60
Dragon	Laird	1894	210	19·5	..	2	290	4,500	27·14	1-12 pr. 3-6 prs.	1	50	..
Ferret .. ..	.. ..	1893	194	19·25	5	2	280	4,810	27·62	1-12 pr. 3-6 prs.	1	50	70
Fervent	Hanna	1895	200	19	7·8	2	275	3,800	[27]	1-12 pr. 5-6 prs.	1	50	70
† Handy	Fairfield	1895	200	19	7·8	2	275	3,800	27·04	1-12 pr. 5-6 prs.	1	50	70
Hardy	Doxford	1895	196	19	5	2	260	4,200	26·8	1-12 pr. 5-6 prs.	2	50	70
† Hart	Fairfield	1895	185	19	7	2	275	4,010	27·07	1-12 pr. 5-6 prs.	1	50	70
* Haaty	Yarrow	1894	190	18·5	5·25	2	270	3,250	26·08	1-12 pr. 5-6 prs.	2	45	60
Haughty	Doxford	1895	196	19	5	2	260	4,000	27·1	1-12 pr. 5-6 prs.	2	50	60
Havock	Yarrow	1893	180	18·5	5·25	2	240	3,500	26·77	1-12 pr. 3-6 prs.	1	43	57
Hornet .. ..	.. ..	1893	180	18·5	5·25	2	240	4,000	27·31	1-12 pr. 3-6 prs.	1	43	57
† Hunter	Fairfield	1895	200	19·7	6·5	2	275	4,000	27·2	1-12 pr. 5-6 prs.	1	45	60
Janus	Palmer	1895	200	19·7	6·5	2	275	3,789	27·8	1-12 pr. 5-6 prs.	2	50	60
Lightning .. ..	.. ..	1895	200	19·7	6·5	2	275	4,007	27·94	1-12 pr. 5-6 prs.	2	50	60
Lynx	Laird	1894	194	19·25	5	2	280	4,000	27·00	1-12 pr. 3-6 prs.	1	50	70
Opussum	Palmer	1895	200	19	5·2	2	295	4,052	28·24	1-12 pr. 5-6 prs.	1	50	60
Porcupine .. ..	.. ..	1895	200	19·7	6·5	2	275	3,866	27·91	1-12 pr. 5-6 prs.	2	50	60
Ranger .. ..	.. ..	1895	200	19	5·2	2	295	3,900	27·13	1-12 pr. 5-6 prs.	1	50	60
Rocket	Brown & Co. ..	1894	205·6	19·5	5·25	2	280	4,200	27·37	1-12 pr. 5-6 prs.	2	50	60
Salmon	Earle's Co. ..	1895	200	19·5	5·4	2	305	3,580	27·60	1-12 pr. 5-6 prs.	2	50	60
Shark	Thomson	1894	205·6	19·5	5·25	2	280	4,250	27·69	1-12 pr. 5-6 prs.	2	50	63
Snapper	Earle's Co. ..	1895	200	19·5	5·5	2	305	4,500	27·9	1-12 pr. 5-6 prs.	2	50	60
Spitfire	Armstrong	1895	200	19	5·3	2	295	3,780	27·5	1-12 pr. 5-6 prs.	1	45	60
Starfish	Vickers	1895	195	20·5	..	2	265	4,000	27·97	1-12 pr. 5-6 prs.	2	45	60
Sturgeon .. ..	.. ..	1894	195	20·5	..	2	265	4,010	27·16	1-12 pr. 3-6 prs.	2	45	60
Sunfish	Palmer	1895	200	19	5·2	2	295	4,292	27·62	1-12 pr. 5-6 prs.	1	50	60
Surly	Thomson	1894	205·6	19·5	5·25	2	280	4,400	28·05	1-12 pr. 5-6 prs.	2	50	60
Swordfish	Armstrong	1895	200	19	5·3	2	295	4,100	[27]	1-12 pr. 5-6 prs.	1	45	60
Teazer	White	1895	200	19·5	5·6	2	320	4,500	[27]	1-12 pr. 5-6 prs.	2	50	60
Wizard .. ..	.. ..	1895	200	19·5	5·2	2	320	4,400	[27]	1-12 pr. 5-6 prs.	2	45	60
Zebra	Thames Ironworks	1895	200	20	6	2	310	3,850	27·00	1-12 pr. 5-6 prs.	1	50	60
Zephyr	Hanna	1895	200	19	5·3	2	275	3,850	[27]	1-12 pr. 5-6 prs.	1	50	60
† Albatross	Thornycroft ..	1898	227·6	21·25	8·5	2	430	7,900	32	1-12 pr. 5-6 prs.	2	68	100
† Angler .. ..	.. ..	1897	210	19·6	7·1	2	310	5,800	30·37	1-12 pr. 5-6 prs.	2	60	80
Arab	Brown & Co. ..	1901	218	20·0	5·6	2	470	8,000	31	1-12 pr. 5-6 prs.	2	60	80
† Ariel	Thornycroft ..	1897	210	19·6	7·1	2	310	5,800	30·59	1-12 pr. 5-6 prs.	2	60	80
† Avon	Vickers	1896	210·6	21·6	5·6	2	355	6,000	30	1-12 pr. 5-6 prs.	2	60	80
Bat	Palmer	1896	215	20·75	6·8	2	360	6,185	30·1	1-12 pr. 5-6 prs.	2	60	91
† Bittern	Vickers	1897	210·6	21·6	5·6	2	355	6,000	30	1-12 pr. 5-6 prs.	2	60	80
Brazen	Brown & Co. ..	1896	218	20·0	5·6	2	315	6,000	30	1-12 pr. 5-6 prs.	2	60	80
† Bullfinch	Earle's Co. ..	1898	210	20·6	5·8	2	345	5,800	30	1-12 pr. 5-6 prs.	2	60	80
† Cheerful	Hawthorn	1897	210	21·0	8	2	355	6,000	30	1-12 pr. 5-6 prs.	2	62	82
† Coquette	Thornycroft ..	1897	210	19·5	7·2	2	335	5,800	30·31	1-12 pr. 5-6 prs.	2	60	80
Crane	Palmer	1896	215	20·7	6·8	2	360	6,336	30·3	1-12 pr. 5-6 prs.	2	60	80
† Cygnet	Thornycroft ..	1898	210	19·5	7·2	2	335	5,800	30·35	1-12 pr. 5-6 prs.	2	60	80
† Cynthia .. ..	.. ..	1898	210	19·5	7·2	2	355	5,800	30·2	1-12 pr. 5-6 prs.	2	60	80
† Despatch .. ..	.. ..	1896	210	19·6	7·2	2	310	5,800	30	1-12 pr. 5-6 prs.	2	60	80
† Dove	Earle's Co. ..	1898	210·0	20·6	5·8	2	345	5,800	30	1-12 pr. 5-6 prs.	2	60	80
Earnest	Laird	1896	210·6	21·7	5·3	2	355	6,000	30·13	1-12 pr. 5-6 prs.	2	58	80
Electra	Brown & Co. ..	1896	218	20·0	5·6	2	310	6,000	30	1-12 pr. 5-6 prs.	2	58	80
Express	Laird	1897	227·6	22·0	9	2	465	9,000	31	1-12 pr. 5-6 prs.	2	60	80
Fairy	Fairfield	1897	227·6	22·0	9	2	355	6,000	30	1-12 pr. 5-6 prs.	2	60	80
† Falcon .. ..	.. ..	1899	220	21·3	9	2	375	6,000	30	1-12 pr. 5-6 prs.	2	60	80
† Fame	Thornycroft ..	1896	210·6	19·6	7·1	2	310	5,800	30·16	1-12 pr. 5-6 prs.	2	60	80
Fawn	Palmer	1897	215	20·7	6·8	2	360	6,581	30·5	1-12 pr. 5-6 prs.	2	60	91
Flirt .. ..	.. ..	1897	215	20·7	6·8	2	360	6,682	30	1-12 pr. 5-6 prs.	2	60	91
Flying Fish .. ..	.. ..	1897	215	20·7	6·8	2	360	6,416	30·4	1-12 pr. 5-6 prs.	2	58	91

* Built by Yarrow, fitted with Thornycroft W.T. boilers at Earle's. All Yarrow-built destroyers have Reed's boilers. Vessels marked † have Thornycroft W.T. boilers. The Skate has been used as a target.

Great Britain—continued.

Name or Number.	Built by.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Mean Speed on Trial, or expected.	* Armament.	Torpedo Tubes.	Complement.	Coal Capacity.	
			Length.	Beam.	Draught.									
TORPEDO-BOAT DESTROYERS.														
†Foam	Thornycroft ..	1896	210	19' 6"	7' 1"	2	310	5,800	30' 18"	1-12 pr. 5-6 prs.	2	58	80	
Gipsy	Fairfield ..	1897	227' 6"	22' 0"	9	2	355	6,000	30	1-12 pr. 5-6 prs.	2	60	80	
Greyhound ..	Hawthorn ..	1900	210	21	8' 6"	2	385	6,000	30	1-12 pr. 5-6 prs.	2	60	90	
Griffin	Laird ..	1896	210' 0"	20	5' 3"	2	355	6,000	30' 11"	1-12 pr. 5-6 prs.	2	58	80	
Kestrel	Brown & Co. ..	1898	218	20' 0"	5' 6"	2	350	6,000	30	1-12 pr. 5-6 prs.	2	60	80	
Kangaroo ..	Palmer ..	1900	215	20' 7' 5"	6' 8"	2	370	6,500	30	1-12 pr. 5-6 prs.	2	..	91	
†Lee	Doxford ..	1899	210 0	19' 9"	7' 6"	2	365	5,400	80	1-12 pr. 5-6 prs.	2	58	80	
Leopard	Vickers ..	1897	210	20' 0"	5' 6"	2	350	6,000	30	1-12 pr. 5-6 prs.	2	60	80	
Leven	Fairfield ..	1898	218 0	20' 0"	5' 6"	2	370	6,000	30	1-12 pr. 5-6 prs.	2	58	80	
Lively	Laird ..	1900	218	20' 0"	5' 6"	2	385	6,000	30	1-12 pr. 5-6 prs.	2	58	80	
Locust	" ..	1896	210	21' 7"	5' 3"	2	355	6,000	30' 16"	1-12 pr. 5-6 prs.	2	58	80	
†Mallard ..	Thornycroft ..	1896	210' 6"	19' 6"	7' 1"	2	310	5,800	30' 11"	1-12 pr. 5-6 prs.	2	60	80	
Mermala ..	Hawthorn ..	1898	210	21' 0"	8	2	355	6,000	30	1-12 pr. 5-6 prs.	2	62	82	
Myrmidon ..	Palmer ..	1900	215	20' 7' 5"	6' 8"	2	370	6,500	30	1-12 pr. 5-6 prs.	2	..	91	
Orwell	Laird ..	1898	218' 0"	20' 0"	5' 6"	2	360	6,000	30	1-12 pr. 5-6 prs.	2	58	80	
Osprey	Fairfield ..	1897	227' 6"	22' 0"	9	2	355	6,000	30	1-12 pr. 5-6 prs.	2	60	80	
†Ostrich ..	" ..	1900	210	21' 0"	9	2	375	6,000	30	1-12 pr. 5-6 prs.	2	60	80	
Otter	Vickers ..	1896	210	20' 0"	5' 6"	2	350	6,000	30	1-12 pr. 5-6 prs.	2	60	80	
Panther	Laird ..	1897	210' 6"	21' 7"	5' 3"	2	355	6,000	30' 14"	1-12 pr. 5-6 prs.	2	58	80	
Peterel	Palmer ..	1899	215	20' 8"	..	2	370	6,200	30	1 12 pr. 5-6 prs.	2	62	85	
Quail	Laird ..	1896	213' 6"	21' 6"	5' 3"	2	355	6,000	30' 38"	1-12 pr. 5-6 prs.	2	58	90	
Racehorse ..	Hawthorn ..	1900	210	21	8' 6"	2	385	6,000	30	1-12 pr. 5-6 prs.	2	60	90	
Recruit	Brown & Co. ..	1896	218' 0"	20' 0"	5' 6"	2	350	6,000	30	1-12 pr. 5-6 prs.	2	58	80	
Roebeek	Hawthorn ..	1901	210	21	8' 6"	2	385	6,000	30	1-12 pr. 5-6 prs.	2	60	90	
Seal	Laird ..	1897	218' 0"	20' 0"	5' 6"	2	355	6,000	30' 15"	1-12 pr. 5-6 prs.	2	58	80	
Spitfire	Palmer ..	1899	215	20' 7' 5"	6' 8"	2	365	6,500	30' 1	1-12 pr. 5-6 prs.	2	..	91	
Sprightly ..	Laird ..	1900	218	20' 0"	5' 6"	2	385	6,000	30	1-12 pr. 5-6 prs.	2	58	80	
†Stag	Thornycroft ..	1900	210	19' 7' 5"	7' 2"	2	320	5,800	30	1-12 pr. 5-6 prs.	2	60	80	
Star	Palmer ..	1896	215	20' 7' 5"	6' 8"	2	360	6,265	30' 7"	1-12 pr. 5-6 prs.	2	58	91	
Success	Doxford ..	1901	210' 0"	21' 0"	9' 2"	2	380	6,000	30	1-12 pr. 5-6 prs.	2	62	43	
†Sylvia	" ..	1897	210	19' 9"	7' 6"	2	350	5,400	30	1-12 pr. 5-6 prs.	2	58	80	
Syren	Palmer ..	1900	215	20' 7' 5"	6' 8"	2	390	6,500	30	1-12 pr. 5-6 prs.	2	..	91	
Taku	Schichau ..	1898	193' 6"	20	5	2	305	6,500	32	6-3 pr. q.	3	..	67	
Thorn	Brown & Co. ..	1900	210	21	5' 5"	2	380	6,000	30	1-12 pr. 5-6 prs.	2	58	80	
Thrasher ..	Laird ..	1895	210' 6"	21' 7"	5' 3"	2	355	6,000	30' 13"	1-12 pr. 5-6 prs.	2	58	80	
Vigilant ..	Brown & Co. ..	1900	210	21	5' 5"	2	380	6,000	30	1-12 pr. 5-6 prs.	2	58	80	
†Violet	Doxford ..	1897	210	20' 7' 5"	6' 8"	2	350	5,400	30	1-12 pr. 5-6 prs.	2	58	80	
Virago	Laird ..	1895	210' 6"	21' 7"	5' 3"	2	355	6,000	30' 13"	1-12 pr. 5-6 prs.	2	58	80	
αVixen	Vickers ..	1900	210' 0"	20' 0"	5' 8"	2	400	6,000	30	1-12 pr. 5-6 prs.	2	62	88	
Vulture	Brown & Co. ..	1898	218	20	5' 6"	2	345	6,000	30	1-12 pr. 5-6 prs.	2	58	80	
Whiting	Palmer ..	1896	215	20' 7' 5"	6' 8"	2	360	6,239	30' 2"	1-12 pr. 5 6 prs.	2	58	91	
Wolf	Laird ..	1897	218	20	5' 6"	2	355	6,000	30	1-12 pr. 5-6 prs.	2	58	80	
Derwent ..	Hawthorn ..	1904	220	23	10	2	534	7,000	25	4-12 prs.	2	70	130	
†Eden	" ..	1903	220	23	8½	6	527	7,000	25		2	70	130	
Eke	Palmer ..	..	225	23½	10	2	540	7,000	25½		2	70	127
Ribbie	Yarrow ..	1904	225	23½	10	2	550	7,500	26		2	70	120	
Itchen	Laird ..	1903	225	23½	10	2	550	7,000	25½		2	70	130	
Uk	Yarrow ..	..	225	23½	10	2	550	7,500	26		2	70	120
Teviot	Yarrow ..	..	225	23½	10	2	550	7,500	26		2	70	120
Ritrick	Palmer	225	23½	10	2	540	7,000	25½		4-12 prs.	2	70	127
Foyle	Laird	225	23½	10	2	550	7,000	25½			2	70	120
Erne	Palmer	225	23½	10	2	540	7,000	25½			2	70	127
Arun	Laird	225	23½	10	2	550	7,000	25½			2	70	130
Blackwater ..	Laird ..	..	225	23½	10	2	550	7,000	25½		2	70	130
Cherwell ..	Palmer ..	..	225	23½	10	2	540	7,000	25½		2	70	127
Dee	Palmer ..	..	225	23½	10	2	540	7,000	25½		2	70	127
Jed	Thornycroft ..	1904	222	23½	9' 6"	2	640	7,500	25½		1-12 pr. 5-6 prs.	2	70	126
Kennet	" ..	1903	222	23½	9' 6"	2	640	7,500	25½			2	70	126
†Véloc	Parsons ..	1902	210	23	8½	8	440	8,000	27	4-12 prs.	2	63	130	
Waveney ..	Hawthorn ..	1903	220	23½	10	2	534	7,000	25		2	70	130	
Welland ..	Yarrow ..	1904	225	23½	10	2	550	7,500	26	2	70	120		
Chelmer ..	Thornycroft ..	1904	222	23½	9' 6"	2	600	7,500	25' 5"	4-12 prs.	2	72	95 126	
Boyne	Hawthorn ..	1904												
Colne	Thornycroft ..	1905												
Doon	Hawthorn ..	1904												
Garry	Yarrow ..	1905												
Kale	Hawthorn ..	1904												
Rother	Palmer ..	1904												
Liffey	Laird ..	1904												
Moy	" ..	1904												
Nora	White ..	1905												
Nith	" ..	1905												
Osse	Laird ..	1905												
Swale	Palmer ..	1905												
Ure	Palmer ..	1904												
Wear	Palmer ..	1905												

* The River class of t.b.d. have had 3 12-pr. 8 cwt. guns substituted for the 5 6-prs. they now carry.

† Have Thornycroft W.T. boilers.

† Hulls and Yarrow boilers of these vessels by Hawthorn Leslie & Co.

Tiger lost in collision with the Berwick during night operations, April 2, 1908.

α Has four Express W.T. boilers.

Gala lost in collision with the Attentive during night operations, April 27, 1908.

Great Britain—continued.

Name or Number.	Built by.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal or Oil.
			Length.	Beam.	Draught.								
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
OCEAN-GOING DESTROYERS.													
*Afridi	Armstrong	1907	250	25	7·6	3	795	14,250	..	3-12-prs.	2	60	92½e
*Cossack	Laird	1907	270	26	8·7	3	890	14,000	33·15				78
*Ghurka	Hawthorn	1907	255	25·7	8·8	3	880	14,250	34				98
*Mohawk	White	1907	270	25	8·9	3	870	14,500	34·51	3-12 prs.	2	68	74
*Tartar	Thornycroft	1907	270	26	8·7	3	860	14,500	35·67				76
*Saracen	White	1908	272	26	8·8	3	893	15,500	33·73				84e
*Amazon	Thornycroft	1908	280	26½	9·3	3	939	15,500	33·73	2·4-in.	2	67	86e
*Crusader	White	1909	280	..	..	3	945	..	..				99e
*Maori	Denny	Bldg.	280	..	..	3	980	..	..				103e
*Nubian	Thornycroft .. ..	..	280	26½	10·3	3	980	15,500	33	2·4-in.	2	71	97½e
*Viking	Palmer .. .. .	..	280	..	..	3	1000	..	..				102½e
*Zulu	Hawthorn .. ..	..	278	27	8·9	3	990	..	..				91e
*Albacore	Palmer b	1908	..	..	..	..	..	..	..	..	..	..	..
*Bonetta	White .. .. .	..	..	..	..	..	..	..	..	..	..	..	..
*Basilisk	John Brown .. ..	..	..	..	..	..	..	..	..	..	..	..	..
*Beagle .. .. .	.. .. .	..	..	..	..	..	..	..	..	..	..	..	..
*Bulldog .. .. .	.. .. .	..	..	..	..	..	..	..	..	..	..	..	..
*Foxhound .. .. .	.. .. .	..	..	..	..	..	..	..	..	..	..	..	..
*Grasshopper	Fairfield .. .. .	..	260-270	28	..	3	900-970	12,500	27	5-12 prs.	2	70	..
*Harpy	White .. .. .	..	..	..	..	..	..	..	..				..
*Mosquito	Fairfield .. .. .	..	..	..	..	..	..	..	..				..
*Nautilus	Thames Ironworks .. ..	..	..	..	..	..	..	..	..	5-12 prs.	2	70	..
*Pincher	Denny .. .. .	..	..	..	..	..	..	..	..				..
*Raccoon	Cammell Laird .. ..	..	..	..	..	..	..	..	..				..
*Rattlesnake	Lond. & Glasgow Co. .. ..	..	..	..	..	..	..	..	..	..	..	..	..
*Renard	Cammell Laird .. ..	..	..	..	..	..	..	..	..	..	..	..	..
*Savage	Thornycroft .. ..	..	264	28	9·3	3	920	..	..	5-12 prs.	2	70	..
*Scorpion	Fairfield .. .. .	..	260-270	28	..	3	900-970	12,500	27				..
*Scourge	Hawthorn .. .. .	..	266½	28	8·6	3	966	..	..				..
*Wolverine	Cammell Laird .. ..	..	260-270	28	..	3	900-970	..	..	..	..	..	..
*20 t.b.d's (programme 1909-10) .. .. .	.. .. .	..	..	..	..	..	..	..	..	..	..	..	..

* Fitted with turbines and for using oil fuel. † Have Thornycroft W.T. boilers. ‡ Fitted with modified Yarrow W.T. boilers.
 § Oil. || Gasoline e Estimated.
 b Purchased after completion, 1909, to replace Tiger and Gala.

Great Britain—continued.

Name or Number.	Built by.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armour.	Torpedo Tubes.	Complement.	Coal or Oil.
			Length.	Beam.	Draught.								
TORPEDO BOATS.													
FIRST CLASS—													
a34-38 (5 boats) ..	White	1886	125	14·6	4	1	60-66	950	18-19	..	5	15	..
39, 40 (2 boats) ..	Yarrow	1885	100	12·5	..	..	40	500	..	..	1	15	..
41-60 (20 boats) ..	Thornycroft ..	1886	127·5	12·5	6·2	1	60	700	21	2-3 prs.	4	15	..
61, 63-74, 76-78 (16 boats) ..	Yarrow	1886	125	13	5·5	1	75	700	19-20	2-3 prs.	5	15	20
79 .. ..	.. ..	1886	125	13	5·5	..	75	1,000	22·4	2-3 prs.	..	15	20
80 .. ..	.. ..	1887	135	14	6	1	105	1,540	23	4-3 prs.	5	21	30
81	White	1885	150	17·5	..	1	125	..	..	6-3 prs.	3	25	35
82-87 (6 boats) ..	Yarrow	1889	130	13·5	5·5	1	85	1,100	23	3-3 prs.	3	19	20
88, 89 (2 boats) ..	.. ..	1894	142	14·75	4·5	1	112	1,600	..	3-3 prs.	3	18	20
90 .. ..	.. ..	1895	140	14·25	3·7	1	100	1,430	..	3-3 prs.	3	18	18
91, 92 (2 boats) ..	Thornycroft ..	1894	140	15·5	7·5	1	130	2,400	23-24	3-3 prs.	3	18	25
93 .. ..	.. ..	1893	140	15·5	5·4	2	130	2,200	23·5	3-3 prs.	3	18	25
94-96 (3 boats) ..	White	1894	140	15·5	..	1	130	2,000	23·2	3-3 prs.	3	18	25
97	Laird	1893	140	15·5	..	1	130	2,690	23·35	3-3 prs.	3	18	25
98 and 99 .. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
† 107 and 108	Thornycroft ..	1901	160	17	8·4	1	178	2,850	25	3-3 prs.	3	32	20
109-113 .. ..	.. ..	1902	166	17·25	8·4	1	200	2,900	25	3-3 prs.	3	32	42
114-117	White	1903	165	17·6	8·8	1	205	2,900	25	3-3 prs.	3	32	23
118-121 (5 boats (1-5)) ..	White	1906	175	17½	5·8	3	235	3,750	26	2-12 prs.	3	35	..
122-125 (5 boats (6-10)) ..	Thornycroft ..	1906-7	166½	17½	6·3	3	255	3,750	27·3	2-12 prs.	3	35	20 f
126-129 (4 boats (11-12)) ..	Yarrow	1907	172	18	5·3	3	225	3,750	26	2-12 prs.	3	35	..
130-133 (4 boats (13-16)) ..	White .. ..	.. ..	182	18	5·10	3	256	4,000	26	2-12 prs.	3	..	..
134-137 (2 boats (17-18)) ..	Denny	1907	180	18	5·6	3	251	4,000	26	2-12 prs.	3	..	..
138-141 (2 boats (19-20)) ..	Thornycroft ..	1907-8	178·6	18·3	6·5	3	280	4,000	26	2-12 prs.	3	..	23·5 f
142-145 (2 boats (21-22)) ..	Hawthorn ..	1907-8	185	18·6	5·4	3	267	4,000	26	2-12 prs.	3	..	..
No. 23	Yarrow	1907	177·3	18	5·4	3	253	4,000	26	2-12 prs.	3	..	..
No. 24	Palmer	1908	177	17·9	5·11	3	263	4,000	26	2-12 prs.	3	..	..
146-149 (4 boats (25-28)) ..	White	1908	182	18	6·0	3	262	4,000	26	2-12 prs.	3	..	..
150-153 (2 boats (29-30)) ..	Denny	1908	180	18	5·3	3	259	4,000	26	2-12 prs.	3	..	..
154-157 (2 boats (31-32)) ..	Thornycroft ..	1908	178·6	18·75	6·2	3	287	4,000	26·5	2-13 prs.	3	33	..
158-161 (2 boats (33-34)) ..	Hawthorn ..	..	185	18·6	5·5	3	265	4,000	26	2-16 prs.	3	..	..
162-165 (3 boats (35-36)) ..	Palmer .. ..	..	177	17·9	5·11	3	261	4,000	26	2-12 prs.	3	33	24

* Fitted with turbines and for using oil fuel. † Have Thornycroft W.T. boilers. ‡ Fitted with modified Yarrow W.T. boilers.
 a All the older types of T.R.s from No. 34 to 98 remaining on the list now have a cipher before the figures as No. 034-No. 098.
 † Oil. ‡ Gasoline. ¶ These boats were originally named, as shown in the *Naval Annual* for 1906-1907. e Estimated.
 Torpedo Boats 047 and 099 are to be repaired at a cost of £12,947 and £7,813 respectively. f 1000 knots.

Number.	Built by.	Launched.	Dimensions.		Number of Screws.	Submerged Displacement.	Indicated Horse-Power.	Speed.		Torpedo Tubes.	Complement.	Coal or Oil.
			Length.	Beam.				Surface.	Submerged.			
SUBMARINES.												
5 boats (Nos. 1-5) .	Vickers	1901-2	Feet. 63·4	Feet. 11·9	1	Tons. 120	150	Knots. 8	Knots. 5	1	7	..
3 boats (Nos. A 2-A 4, programme 1902-3) }	.. ..	1903	100	10	1	204	450	11	7	2	..	11
9 new boats (Nos. A5- A 13 (programme 1903-4)) .. . . .	.. ..	1904	150	..	..	204	600	16	9	2	..	..
11 new boats (B Class)	.. ..	1905	135	13½	..	313	600	13	9	..	..	15
11 new boats (pro- gramme 1905-6) C class .. . . .	.. ..	1906-7	135	13½	..	313	600	14	10	2	..	15
6 boats (programme 1906-7) C12-16 D11	Contract	1907-8	135	13½	..	313	600	13	..	2	..	15
2 boats (programme, 1906-7) C17 & C18	Chatham	1908	135	13½	..	313	600	13	..	2	..	15
2 (programme 1907-8), C19-C 20	Chatham	Bldg.	135	13½	..	321	600	13	10	2	..	15
10 (programme 1907-8) ✓ C 21-C 24 C 25-C 30	Contract	{ 1908 Bldg. }	135	13½	..	321	600	13	..	..	..	15
2 (programme 1908-9)	Chatham .. ..	.. ..	..	..	..	..	..	..	..	..	..	..
7 (programme 1908-9)	Contract	Bldg.	..	..	..	..	..	..	..	..	..	..
Number unknown (programme 1909-10)	.. ..	.. ..	..	..	..	..	..	..	..	..	..	..

Argentine Republic.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Corrientes	Yarrow ..	1896	190	19' 6	7' 4	2	280	4,000	27' 4 f.	{ 1 14-pr. 3 6-pr. Q.F., 2 m.	3	54	80
Misiones	Yarrow ..	1896	190	19' 6	7' 4	2	280	4,000	26' 0 f.		3	54	80
Entre Rios	Yarrow ..	1896	190	19' 6	7' 4	2	280	4,000	26' 7 f.		3	54	80
FIRST CLASS—													
2 boats	Thornycroft	1890-1	150	14' 5	5' 2	2	110	1,500	24' 52	3 3-pr.	3	27	22
6 boats	Yarrow ..	1890	130	13' 5	6	1	85	1,200	23-24	2 3-pr. Q.F.	2	15	15

The two 150-ft. boats are named Comodoro Py and Murature.
 The six 130-ft. boats are named Bathurst, Buchardo, Jorge, King, Pinedo, and Thorne. They have locomotive boilers.
 Six destroyers of 650 tons and twelve of 480 tons are to be built.

Austria-Hungary.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.											
			Length.	Beam.	Draught.																			
DESTROYER—																								
Huszár	Yarrow ..	1905	219·8	20·3	..	2	383	6,000	28·5	{ 1 12-pr. } { 7 3-pr. }	..	64	..											
Streiter	Trieste ..	1906																						
Ulan		1906																						
Wildfang		1906																						
Uskoke		1907																						
Scharfschütze		1907																						
Dinara	Fiume ..	Bldg.																						
Csikós																								
Pandur																								
Reka																								
Turul																								
Velebit																								
FIRST CLASS—																								
Adler, Falke	Yarrow ..	1886	135	13·7	5·6	1	95	900	22·4	2 Nord.	2	16	28											
22 boats	{ Elbing, Trieste, &c. Yarrow ..	1890-92	128	15·9	6·9	1	83	{ 900 } { 1,000 }	{ 17·5 to } { 21·5 }	2 mach.	2	15	28											
Kaiman	Trieste ..	1905	179·9	18·0	..	1	197	3,000	26	4 3-pr.	..	25	..											
Alligator		1906-7																						
Anaconda																								
Drache																								
Delfin																								
Greif																								
Hal																								
Krokodil																								
Moewe																								
Narwal																								
Pinguin																								
Schwalbe																								
Seehund																								
Wal																								
Triton																								
Alk	Fiume ..	Bldg.																						
Echse																								
Hydra																								
Kormoran																								
Krake																								
Molk																								
Phönix																								
Polyp																								
Skorpion																								
Boa																								
Cobra	Yarrow ..	1898-9	152·6	15·3	7·6	1	133	2,000	24·3	2 3-pr. Q.F.	3	24	30											
Kigyo	Yarrow ..	1896	147·6	14·9	7·6	1	130	2,000	26·5	2 3-pr. Q.F.	2	26	30											
Python	Yarrow ..	1896	150	17·5	8·8	2	152	2,300	26·5	2 3-pr. Q.F.	3	..	30											
Viper																								
Natter																								
SUBMERISBLES—																								
U 1 and 2	Pola	1908	141·8	12·3	7·4	2	{ 240- 300 }	{ 600- 300 }	12·8	..	2	17	..											
U 3 and 4	Kiel, Germania	1908-9																						
U 5 and 6	Fiume ..	1908																						
U 7	Fiume ..	Bldg.																						

Two submarine boats building at Barrow.

Brazil.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Para		1908											
Amazonas		1908											
Platuy		1908											
Matto Grosso		1908											
Parahyba	Yarrow ..	Bldg.											
Rio Grande del N		1909	240	23·6	10	..	560	8,000	28	2 4-in., 4 3 prs.	2	..	..
Alagoas		Bldg.											
Santa Catharina		Bldg.											
Parana		Bldg.											
Sergipe		Bldg.											
FIRST CLASS—													
Araguary	Thornycroft	1891	150	14·5	5·2	2	150	1,550	25·1	2 Q.F.	4	27	22
Ignatemi	Thornycroft	1891	150	14·5	5·2	2	150	1,550	25·4	2 Q.F.	4	27	22
Marcillo Dias	Thornycroft	1891	150	14·5	5·2	2	150	1,550	25·8	2 Q.F.	4	27	22
5 boats	Elbing ..	1892-3	152	17·2	7·9	2	130	2,200	28	2-1 prs.	3	24	30
Goyaz	Yarrow ..	1907	152·5	15·3	..	..	..	..	26·5	2-3 prs.	2	..	..

Two submarine boats, Jacinto Gomes and Mello Marques.

Chili.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Capitan Orella ..	Laird ..	1896	210	21·6	5·4	2	300	6000	30·17	1-12 pr. Q.F. 5-6 pr.	2	65	90
Capitan Munoz Gamero ..	Laird ..	1896	210	21·6	5·4	2	300	6000	30·42	1-12 pr. Q.F. 5-6 pr.	2	65	90
Teniente Serrano	Laird ..	1896	210	21·6	5·4	2	300	6000	30·35	1-12 pr. Q.F. 5-6 pr.	2	65	90
Guardia-Marina	Laird ..	1896	210	21·6	5·4	2	300	6000	30·09	1-12 pr. Q.F. 5-6 pr.	2	65	90
Riquelme	Laird ..	1896	210	21·6	5·4	2	300	6000	30·09	1-12 pr. Q.F. 5-6 pr.	2	65	90
Capitan Merino	Laird ..	1901	210	21·6	5·4	2	350	6000	30	Do.	2	65	90
Capitan O'Brien ..	Laird ..	1901	210	21·6	5·4	2	350	6000	30	Do.	2	65	90
FIRST CLASS—													
Ingeniero Hyatt, Cirujano Videla, Ingeniero Mutilla, Guardia-Marina Contreras, Capitan Thompson, and Teniente Rodriguez (Viper type) ..	Yarrow ..	{1896 {1898	152·6	15·3	7·9	1	140	2200	27·5-27·2	3-3 pr. Q.F.	3	28	40
Tegualda, Quidora, and Fresia	Yarrow ..	..	87	10·9	..	1	..	400	..	..	..	..	..
SECOND CLASS—													
1 boat	White ..	1892	60	9·6	5	1	15	270	19	..	1	..	..
1 boat	La Seyne ..	1895	42	8·6	..	1	..	..	..	..	1	..	..

The Thompson and Rodriguez were sent out in sections, and put together at Talcahuano and Valparaiso.

China.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
FIRST CLASS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
3 boats	Elbing ..	1896-97	144·3	16·4	7·5	1	128	1,400	24·2	4 1-pr. revs.	2	20	15
25 boats	Stettin, &c. ..	1896-87	110	13	4·9	1	65	1,000	19·5	1-pr. revs.	3	16	10
2 boats	Stettin ..	1897	123·5	21·7	..	..	120	..	20	2 1-pr.	3	20	..
SECOND CLASS—													
1 boat	Foochow ..	1903	88·6	6·7	3·3	1	30	550	20·5	..	..	..	..

About twenty boats only are said to be serviceable. Four boats building in Japan.

Denmark.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
FIRST CLASS—			Feet.	Feet.	Feet.		Tons.	2,000	Knots.				Tons.
Ormen	Copenhagen	1907	125	14.3	..	..	98	2,000	26	2 1-pr.	3	..	21
Hajen	Copenhagen	1896	..	..	..	..	..	..	..	1 4.7-in.	..	..	..
Havörnen	Copenhagen	1897	154.3	15.4	7.9	2	142	2,317	22.9	1 1-pr.	3	..	..
Sjöbjörnen	Copenhagen	1898	..	..	..	..	..	..	..	1 mach.	2	14	9
Definen	Thornycroft	1883	111.5	12.6	6	1	59	620	20	2 1-pr. revs.	4	20	15
Havhesten	Thornycroft	1888	137.9	14	7	1	94	1,200	22.8	1 mach.	2	14	10
Hvalrossen	Thornycroft	1884	114	12.6	6.5	1	64	660	18.7	..	..	..	..
Makrelen	Copenhagen	1893	140	14.2	7	2	112	1,200	..	2 1-pr. revs.	4	20	15
Narhvalen	Thornycroft	1888	137.9	14	7	1	94	1,200	22.3	2 mach.	4	20	14
Nord Kaperen	Copenhagen	1893	140	14.2	7	2	112	1,200	..	2 1-pr. revs.	4	20	16
Sølvén	Thornycroft	1887	131	14.8	6.8	1	89	1,200	23.3	2 mach.	4	20	14
Søulven	Havre...	1880	94.8	10.9	3.9	1	37	450	18.1	..	..	..	..
Springeren	Copenhagen	1891	119	13	4.9	1	81	800	18.3	2 1-pr. revs.	2	20	14
Sören	Thornycroft	1887	131	14.8	6.8	1	89	1,200	23	2 mach.	4	20	14
Sværdfisken	Thornycroft	1881	110	12	6	1	49	600	20.7	1 mach.	2	14	9

Four destroyers and two boats are provided for; of these Messrs. Normand have delivered one—100 tons, 26 knots.
A submarine boat is in hand at Muggiano.

France.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons
Arbalète	Normand	1903	183.9	20.11	10.3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Arc	Châlon	1903	183.9	20.11	10.3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Arquebuse	Normand	1902	183.9	20.11	10.3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Baliste	Rouen	1903	183.9	20.11	10.3	2	300	6,000	28.4	1-9pr. 6-3prs.	2	62	75
Bélier	Nantes	1903	183.9	20.11	10.3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Bombarda	Havre (F.&C.)	1903	183.9	20.11	10.3	2	300	6,000	30.5	1-9pr. 6-3prs.	2	62	75
Bouclier	Normand	Bldg.	230.3	24.9	..	3	715	13,000	31	2-3 9in. 4-9pr.	4	62	160
Boutefeu	Bordeaux	Bldg.	230.3	24.9	..	3	715	13,000	31	2-3 9in. 4-9pr.	4	62	160
Brancabas	Normand	1907	183.9	21.3	10.3	2	320	5,000	28	1-9pr. 6-3prs.	2	62	84
Carabine	Rocheport	1902	183.9	20.11	10.3	2	305	6,300	28	1-9pr. 6-3prs.	2	62	75
Carabinier	Rouen	1908	210.6	21.9	10.3	3	430	7,200	28	6-9 prs.	3	62	120
Carquois	Rocheport	1907	190.3	19.6	10.3	2	335	7,200	30	19-pr. 4-3-prs.	2	62	37
Casque	Havre (F.&C.)	Bldg.	230.3	24.9	..	3	715	13,000	31	2-3 9in. 4-9pr.	4	62	160
Catapulte	Havre (F.&C.)	1903	183.9	20.11	10.3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Cavalier	Normand	Bldg.	210.6	21.8	10.3	3	469	8,600	28.1	6-9 prs.	3	62	150
Chasseur	Normand	1909	210.6	21.9	10.3	3	454	7,200	28	6-9 prs.	3	62	120
Cimeterre	Bordeaux	Bldg.	230.3	24.9	..	3	715	13,000	31	2-3 9in. 4-9pr.	4	62	160
Claymore	Normand	1906	190.3	20.11	10.3	2	335	6,000	30.3	1-9pr. 6-3prs.	2	62	75
Cognée	Toulon	1907	190.3	20.11	10.3	2	335	6,000	28	1-9pr. 6-3prs.	2	62	75
Coutelas	Rocheport	1907	190.3	20.11	10.3	2	335	6,000	28	1-9pr. 6-3prs.	2	62	75
Dague	Bordeaux	Bldg.	230.3	24.9	..	3	715	13,000	31	2-3 9in. 4-9pr.	4	62	160
Dard	Rouen	1903	183.9	20.11	10.3	2	310	6,500	29.4	1-9pr. 6-3prs.	2	62	75
Durandal	Normand	1899	180.5	20.8	10.3	2	300	5,000	28	1-9pr. 6-3prs.	2	62	84
Epée	Havre (F.&C.)	1900	190.3	20.8	10.3	2	335	5,700	26	1-9pr. 6-3prs.	2	62	75
Epieu	Normand	1903	183.9	20.11	10.3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Kocopette	Rocheport	1900	183.9	20.8	10.3	2	300	5,700	26	1-9pr. 6-3prs.	2	62	75
Etendard	Bordeaux	1908	210.6	21.9	..	3	430	6,000	28	1-9pr. 6-3prs.	3	..	..
Fanlon	Bordeaux	1908	210.6	21.9	..	3	430	6,000	28	1-9pr. 6-3prs.	3	..	..
Fanfare	Normand	1907	193.9	21.3	10.3	2	320	5,000	28	1-9pr. 6-3prs.	2	62	84
Fantassin	Havre (F.&C.)	Bldg.	210.6	21.8	10.3	3	469	8,600	28	6-9 prs.	3	62	150
Fauconneau	Normand	Bldg.	210.6	21.9	..	3	430	6,000	28	1-9pr. 6-3prs.	3	..	..
Faulx	Nantes	Bldg.	230.3	24.9	..	3	715	13,000	31	2-3 9in. 4-9pr.	4	62	160
Flamberge	Rocheport	1901	183.9	20.8	10.3	2	300	5,700	26	1-9pr. 6-3prs.	2	62	75
Fleuriet	Rocheport	1907	190.3	20.11	10.3	2	335	6,000	28	1-9pr. 6-3prs.	2	62	75
Fongasse .. .. .	..	Bldg.	230.3	24.9	..	3	715	13,000	31	2-3 9in. 4-9pr.	4	62	160
Fourche	Nantes	Bldg.	230.3	24.9	..	3	715	13,000	31	2-3 9in. 4-9pr.	4	62	160
Francisque	Rocheport	1904	183.9	20.11	10.3	2	305	6,300	28	1-9pr. 6-3prs.	2	62	75
Fronde	Bordeaux	1903	183.9	20.11	10.3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	65
Gablon	Rouen	1907	210.6	21.9	..	3	430	6,000	28	1-9pr. 6-3prs.	3	..	..
Glaive	Rocheport	Bldg.	190.3	20.11	10.3	2	335	6,000	28	1-9pr. 6-3prs.	2	62	75
Hache	Toulon	1908	190.3	20.11	10.3	2	335	6,000	28	1-9pr. 6-3prs.	2	62	75
Hallebarde	Normand	1899	180.5	20.8	10.3	2	305	5,300	27.2	1-9pr. 6-3prs.	2	62	84
Harpon	Bordeaux	1903	183.9	20.11	10.3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Hussard	Lorient	Bldg.	210.6	21.9	..	3	430	7,200	28	6-9 prs.	3	62	120
Janissaire	Rouen	Bldg.	210.6	21.8	10.3	3	469	8,600	28	6-9 prs.	3	62	150
Javeline	Nantes	1903	183.9	20.11	10.3	2	300	7,000	29.3	1-9pr. 6-3prs.	2	62	75
Latte .. .. .	..	Bldg.	230.3	24.9	..	3	715	13,000	31	2-3 9in. 4-9pr.	4	62	160
Laquenec	Bordeaux	Bldg.	210.6	21.8	10.3	3	469	8,600	28	6-9 prs.	3	62	150
Mameluck	Nantes	Bldg.	210.6	21.8	10.3	3	469	8,600	28	6-9 prs.	3	62	150
Massue	Toulon	1908	190.3	20.11	10.3	2	335	6,000	28	1-9pr. 6-3prs.	2	62	75
Mortier	Rocheport	1906	190.3	20.11	10.3	2	335	6,300	28	1-9pr. 6-3prs.	2	62	75

N.B.—“F. & C.” “Forges & Chantiers.”

“Normand” means that the boat has been built at that firm's yard at Havre.

France—continued.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
DESTROYERS—cont.													
Mousquet	Nantes ..	1902	183.9	20.11	10.3	2	300	6,300	30.2	1-9pr. 6-3prs.	2	62	75
Mousqueton	Chalon ..	1903	183.9	20.11	10.3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Oublier	Rocheport ..	1907	190.3	20.11	10.3	2	335	6,300	28	1-9pr. 6-3prs.	2	62	75
Oriflamme	Nantes ..	1908	210.6	21.9	..	3	430	6,000	28	1-9pr. 6-3prs.	3	..	..
Pertuisane	Rocheport ..	1900	183.9	20.8	10.3	2	300	5,700	26	1-9pr. 6-3prs.	2	62	75
Pierrier	Rocheport ..	1906	190.3	20.11	10.3	2	335	6,300	28	1-9pr. 6-3prs.	2	62	75
Pique	Havre (F.&C.) ..	1900	190.3	20.8	10.3	2	335	5,700	26	1-9pr. 6-3prs.	2	62	75
Pistolet	Nantes ..	1903	183.9	20.11	10.3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Polignard	Rocheport ..	Bldg.	190.3	20.11	10.3	2	335	6,000	28	1-9pr. 6-3prs.	2	62	75
Rapiere	Rocheport ..	1901	183.9	20.8	10.3	2	300	5,700	26	1-9pr. 6-3prs.	2	62	75
Revolver	Bldg.	230.3	24.9	..	..	3	715	13,000	31	2-39in. 4-9pr.	4	64	160
Sabre	Rocheport ..	1904	183.9	20.11	10.3	2	305	6,300	28	1-9pr. 6-3prs.	2	62	75
Sabretache	Nantes ..	1908	210.6	21.9	..	3	430	6,000	28	6-9 prs.	3	..	..
Sagaie	Havre (F.&C.) ..	1902	183.9	20.11	10.3	2	300	6,000	30.1	1-9pr. 6-3prs.	2	62	75
Sape	Rouen ..	1907	210.6	21.9	..	3	430	6,000	28	1-9pr. 6-3prs.	3	..	..
Sarbacane	Rocheport ..	1903	183.9	20.11	10.3	2	305	6,300	28	1-9pr. 6-3prs.	2	62	75
Spahi	Havre ..	1908	210.6	21.9	..	3	430	7,200	28	6-9 prs.	3	62	120
Styler	Rocheport ..	1905	190.3	20.11	10.3	2	335	6,300	..	1-9pr. 6-3prs.	2	62	75
Takou	Elbing ..	1898	193.7	21.0	..	2	280	6,000	25	6-3 pr. q.r.	2	62	67
Tirailleur	Bordeaux ..	1908	206.9	21.8	9.7	3	410	7,200	28	6-9 pr.	2	62	120
Tromblon	Rocheport ..	1905	190.3	21.0	..	2	335	6,300	25	6-3 pr. q.r.	3	62	67
Trident	Rocheport ..	1907	190.3	19.6	10.3	2	335	7,200	30	1-9pr. 6-3prs.	2	62	37
Valliguer	Nantes ..	Bldg.	210.6	21.9	..	3	430	7,200	28	6-9 prs.	3	62	120
Yatagan	Nantes ..	1900	190.3	20.8	10.3	2	335	5,700	26	1-9pr. 6-3prs.	2	62	33
SEA-GOING—													
Agile	La Seyne ..	1889	139	14.7	7.7	2	121	1,100	20.4	3-3 prs.	2	26	14
Alarme	St. Nazaire ..	1889	151	15.7	8.3	2	169	1,400	20.5	2-3 prs.	4	30	40
Aquillon	Normand ..	1895	137.8	14.6	7.9	2	127	2,000	26.17	2-3 prs.	2	34	17
Archer	Normand ..	1893	138	14.7	6.5	2	131	1,250	21	2-3 prs.	2	26	17
Argonaute	St. Denis ..	1893	141	16.4	9.3	2	132	1,500	25.1	2-3 prs.	2	34	18
Audacieux	Nantes ..	1900	144.2	15.2	10.0	2	152	4,200	30	2-3 prs.	3	..	18
Aventurier	St. Nazaire ..	1889	151	15.7	8.3	2	174	1,400	20.5	2-3 prs.	4	34	40
Averne	Havre (F.&C.) ..	1894	141	16.4	9.3	2	133	1,500	24.4	2-3 prs.	2	27	16
Boree	Bordeaux ..	1900	147.7	16.7	8.0	2	160	4,400	30	2-3 prs.	2	..	18
Bourraque	Normand ..	1901	147.7	16.7	8.0	2	160	4,400	31.41	2-3 prs.	2	..	18
Chevalier	Normand ..	1893	144.3	15.7	6.8	2	134	2,700	27.2	2-1 prs.	2	32	17
Corsaire	St. Denis ..	1893	160.5	15	5.4	2	171	2,500	25.5	4-1 prs.	2	32	15
Coursier	Chiswick ..	1888	147.5	14.5	4.6	2	129	1,580	23.28	4 Nordis.	2	27	22
Cyclone	Normand ..	1898	144.2	15.2	10.0	2	152	4,200	30	2-3 prs.	2	..	18
Daphin	Havre (F.&C.) ..	1894	141	16.4	9.3	2	137	1,500	25.22	2-3 prs.	2	34	16
Dea	St. Nazaire ..	1889	151	15.7	8.3	2	173	1,400	21	2-3 prs.	4	30	40
Dragon	Normand ..	1892	138	14.7	8.2	2	129	1,400	25	2-3 prs.	2	26	15.5
Elair	La Seyne ..	1891	144.3	14.7	7.7	2	128	1,100	21.5	3-3 prs.	2	26	17
Filbustier	Normand ..	1894	143.3	16.4	9.3	2	132	1,500	23.5	2-3 prs.	2	34	16
Forban	Normand ..	1895	144.2	15.2	10	2	135	3,200	31.2	2-1 prs.	2	..	18
Grenadier	Normand ..	1892	138	14.7	8.2	2	129	1,400	25.25	2-3 prs.	2	26	15.5
Grondeur	Havre (F.&C.) ..	1892	147.5	14.5	5	2	130	1,550	24	2-3 prs.	2	27	20
Kabye	La Seyne ..	1891	144.3	14.7	7.7	2	128	1,100	21.6	3-3 prs.	2	27	17
Lancier	Normand ..	1893	138	14.7	8.2	2	129	1,400	25.79	2-3 prs.	2	26	15.5
Mangini	Nantes ..	1896	147.6	14.8	7.9	2	129	2,100	27.5	2-3 prs.	2	34	17
Mistral	Normand ..	1901	147.7	16.8	8.8	2	182	4,200	30	2-3 prs.	3	..	23
Mousquetaire	Havre (F.&C.) ..	1892	154	15.7	7	2	160	2,100	24.77	2-1 prs.	3	32	18
Orange	La Seyne ..	1891	144.3	14.7	7.7	2	129	1,100	21.7	3-3 prs.	2	26	17
Ouragan	Nantes ..	1887	151	15.7	8.3	2	174	1,400	20	2-3 prs.	4	30	40
Rafale	Normand ..	1901	147.7	16.7	8.0	2	160	4,400	31.47	2-3 prs.	2	..	18
Sarrasin	Bordeaux ..	1893	139	14.7	7.7	2	131	1,100	20.5	3-3 prs.	2	26	14
Simoun	Havre (F.&C.) ..	1901	144.2	15.2	10.0	2	152	4,200	30	2-3 prs.	3	..	18
Siroco	Normand ..	1901	147.7	16.8	8.8	2	182	4,200	30	2-3 prs.	3	..	23
Temeraire	St. Nazaire ..	1889	151	15.7	8.3	2	174	1,400	21	2-3 prs.	4	30	40
Tourbillon	Bordeaux ..	1892	139	14.7	7.7	2	131	1,100	20.5	3-3 prs.	2	26	14
Tourmente	St. Denis ..	1893	141	16.4	9.3	..	132	1,500	21.6	2-3 prs.	2	25	15
Tramontane	Bordeaux ..	1900	147.7	16.7	8.0	2	160	4,400	30	2-3 prs.	2	..	18
Trombe	Nantes ..	1900	144.2	15.2	10.0	2	152	4,200	30	2-3 prs.	3	..	18
Turco	St. Denis ..	1892	138	14.7	8.2	2	124	1,400	21.3	2-3 prs.	2	26	15.5
Typhon	Havre (F.&C.) ..	1901	144.2	15.2	10.0	2	152	4,200	30	2-3 prs.	3	..	18
Veloce	Havre (F.&C.) ..	1892	147.5	14.5	5	2	130	1,550	23.6	2-3 prs.	2	27	20
Zouave	St. Denis ..	1892	138	14.7	8.2	2	124	1,400	21.3	2-3 prs.	2	26	15.5
FIRST CLASS—													
126-129 (4 boats) ..	Normand ..	1880-0	118	13.2	8.6	1	80	1,250	21	2-1 prs.	2	21	10
145-149 (5 boats) ..	Normand ..	1891-3	118	13.2	8.7	1	79	1,300	23.9	2-1 prs.	2	21	10
152-154 (3 boats) ..	Normand ..	1892-3	118	13.2	8.7	1	80	1,300	24.6	2-1 prs.	2	21	10
155-157 (3 boats) ..	Bordeaux ..	1893	118	13.2	8.7	1	80	1,300	23	2-1 prs.	2	21	10
158-159 (2 boats) ..	Caill ..	1893	118	13.2	8.7	1	80	1,300	23	2-1 prs.	2	21	10
161-163 (3 boats) ..	St. Nazaire ..	1892	118	13.2	8.7	1	80	1,300	23	2-1 prs.	2	21	10
164-166 (3 boats) ..	La Seyne ..	1892	118	13.2	8.7	1	79	1,300	23	2-1 prs.	2	21	10
167-168 (2 boats) ..	Crausot ..	1892	118	13.2	8.7	1	81	1,300	23	2-1 prs.	2	21	10
170, 171 (2 boats) ..	Normand ..	1893	118	13.2	8.7	1	80	1,300	23-24	2-1 prs.	2	21	10
172, 173 (2 boats) ..	Havre ..	1893-4	118	13.2	8.7	1	89	1,390	23-24	2-1 prs.	2	21	10
174-176 (3 boats) ..	Havre ..	1893-5	118	13.2	8.7	1	94	1,390	23-24	2-1 prs.	2	21	10
177-179 (3 boats) ..	Havre ..	1893	118	13.2	8.7	1	79	1,300	23-24	2-1 prs.	2	21	10
182-187 (6 boats) ..	Normand etc.	1894-5	118	13.2	8.6	1	80	1,500	25.7	2-1 prs.	2	21	10

* Captured from the Chinese at Taku, 1900.

France—continued.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
FIRST-CLASS—contd.													
188-190 (3 boats) ..	Havre, etc.	1893-4	118	13-2	8-6	1	80	1,500	24-2	2-1 prs.	2	21	10
192-194 (3 boats) ..	Havre, etc.	1894-5	118	13-2	8-6	1	82	1,300	23-55	2-1 prs.	2	21	10
195-200 (4 boats) ..	Havre, etc.	1894-5	319	13-2	8-7	1	80	1,300	23-5	2-1 prs.	2	21	10
201-205 (4 boats) ..	Normand. ..	1897-8	121-4	13-4	8-6	1	84	1,700	25-9	2-1 prs.	2	23	10
206-211 (5 boats) ..	Bordeaux ..	1897-8	121-4	13-6	8-6	1	86	1,500	23-5	2-1 prs.	2	23	10
212-215 (4 boats) ..	Normand. ..	1899	121-4	13-6	8-6	1	86	1,800	27	2-1 prs.	2	23	10
216-226 (11 boats) ..	{Cherbourg, etc. Toulon, etc.}	1899- 1902	121-6	13-6	8-6	1	86	1,500	23-6	2-1 prs.	2	23	10
227-235 (8 boats) ..	Bordeaux, etc.	1901	121-4	13-2	8-7	1	86	1,500	23-5	2-1 prs.	2	23	10
236-255 (20 boats) ..	Bordeaux, etc.	1902	121-4	13-2	8-7	1	90	1,500	23-5	2-1 prs.	2	23	10
256-257 (2 boats) ..	Bordeaux, etc.	1900	124-8	13-2	8-7	1	97	2,000	26-0	2-1 prs.	3	24	10
258-261 (4 boats) ..	Bordeaux ..	1902	124-8	13-2	8-7	1	97	2,000	26-0	2-1 prs.	3	24	10
262 (1 boat) ..	Creusot ..	1902	124-8	13-2	8-7	1	97	2,000	26-0	2-1 prs.	3	24	10
264-265 (2 boats) ..	Bordeaux ..	1902	124-8	13-2	8-7	1	97	2,000	26-0	2-1 prs.	3	24	10
266-276 (11 boats) ..	Bordeaux, etc.	1902	124-8	13-2	9-6	1	97	2,000	26-0	2-1 prs.	3	24	10
277-294 (18 boats) ..	Bordeaux, etc.	1904	124-8	14-0	9-6	1	97	2,000	26-0	2-1 prs.	3	26	10
295-317 (23 boats) ..	Normand, etc.	1905											
318-367 (50 boats) ..	Havre, etc.	1905-7	124-8	14-0	9-6	1	97	2,000	26	2-1 prs.	3	26	10
368-369 (2 boats) ..	Toulon ..	1906											
SUBMARINE—													
Algrette ..	Toulon ..	1904	117-6	12-9	8-3	1	172	200	10-5	..	..	20	..
Algérie ..	Cherbourg ..	1901	118	9-2	..	1	146	250	8-13	..	..	9	..
Alose ..	Toulon ..	1903	77	7-6	8-0	1	68	60	8	..	..	5	..
Anguille ..	Toulon ..	1903	77	7-6	8-0	1	68	60	8	..	..	5	..
Bonite ..	Toulon ..	1903	77	7-6	8-0	1	68	60	8	..	..	5	..
Calypso ..	Toulon ..	1907	154-3				314			..	7	..	..
Castor ..	Rocheport ..	1903	77	7-6	8-0	1	68	60	8	..	..	5	..
Cigoguet ..	Toulon ..	1904	117-6	12-9	8-3	1	172	200	10-5	..	..	20	..
Circé ..	Toulon ..	1907	154-3				314			..	7	..	..
Dorade ..	Toulon ..	1903	77	7-6	8-0	1	68	60	8	..	..	5	..
Emeraude ..	Cherbourg ..	1906	146	12-9	12-0	2	390	600	12	..	6	16	..
Espadon ..	Cherbourg ..	1901	111-6	12-4	5-4	1	106-200	250	8-12	..	2	10	..
Esturgeon ..	Toulon ..	1903	77	7-6	8-0	1	68	60	8	..	..	5	..
Fairfax ..	Rocheport ..	1901	135-8	9-5	9-5	1	185	..	8-12½	..	..	9	..
Franchise ..	Cherbourg ..	1901	118	9-9	..	1	146	250	8-13	..	..	9	..
Gnome ..	Rocheport ..	1901	135-8	9-5	9-5	1	185	..	8-12½	..	..	9	..
Gronin ..	Toulon ..	1903	77	7-6	8-0	1	68	60	8	..	..	5	..
Guêpe (Nos. 1 & 2) ..	Cherbourg ..	1908	65-8				44 + 44			..	2	..	..
Korrigan ..	Rocheport ..	1901	135-8	9-5	9-5	1	185	..	8-12½	..	..	9	..
Loutre ..	Rocheport ..	1903	77	7-6	8-0	1	68	60	8	..	..	5	..
Ludion ..	Cherbourg ..	1902	77	7-6	8-0	1	68	60	8	..	..	5	..
Lutin ..	Rocheport ..	1903	135-8	9-5	9-5	1	185	..	8-12½	..	..	9	..
Lynx ..	Cherbourg ..	1902	77	7-6	8-0	1	68	60	8	..	..	5	..
Méduse ..	Rocheport ..	1903	77	7-6	8-0	1	68	60	8	..	..	5	..
Morse ..	Cherbourg ..	1899	118	9-0	9-0	1	144	360	8-12-3	..	1	9	..
Naiade ..	Cherbourg ..	1902	77	7-6	8-0	1	68	60	8	..	..	5	..
Opale ..	Cherbourg ..	1906	146	12-9	12-0	2	390	600	12	..	6	..	..
Otarie ..	Rocheport ..	1903	77	7-6	8-0	1	68	60	8	..	..	5	..
Oursin ..	Rocheport ..	1903	77	7-6	8-0	1	68	60	8	..	..	5	..
Perle ..	Cherbourg ..	1903	77	7-6	8-0	1	68	60	8	..	..	5	..
Phoque ..	Rocheport ..	1904	77	7-6	8-0	1	68	60	8	..	..	5	..
Protee ..	Cherbourg ..	1902	77	7-6	8-0	1	68	60	8	..	..	5	..
Rubis ..	Cherbourg ..	1907	154-3	12-9	12-0	2	390	600	12	..	6	16	..
Saphir ..	Toulon ..	1908	146	12-9	12-0	2	390	600	12	..	6	..	..
Silure ..	Cherbourg ..	1901	111-6	12-4	5-4	1	106-200	250	8-12	..	2	10	..
Sirène ..	Cherbourg ..	1901	111-6	12-4	5-4	1	106-200	250	8-12	..	2	10	..
Souffleur ..	Toulon ..	1903	77	7-6	8-0	1	68	60	8	..	..	5	..
Thon ..	Toulon ..	1903	77	7-6	8-0	1	68	60	8	..	..	5	..
Topaze ..	Cherbourg ..	1908	146	12-9	12-0	2	390	600	12	..	6	..	..
Triton ..	Cherbourg ..	1901	111-6	12-4	5-4	1	106-200	250	8-12	..	2	10	..
Truite ..	Toulon ..	1903	77	7-6	8-0	1	68	60	8	..	..	5	..
Turquoise ..	Toulon ..	1908	146	12-9	12-0	2	390	600	12	..	6	..	..
X ..	Cherbourg ..	1904	122-8	10-2	7-6	2	168	220	10½	..	..	..	..
Y ..	Toulon ..	1905	142-8	9-10	9-10	1	213	250	11	..	..	..	..
Z ..	Rocheport ..	1904	135-8	9-10	9-10	1	202	190	11	..	..	..	..
Omega ..	Toulon ..	1905	160-6	13-9	9-0	1	301	330	11	..	4	20	..
Pluviose, Ventose, ..													
Nivose, Germinal, ..													
Floreal, Prairial, ..													
Messidor, Thermidor, ..	Cherbourg ..	1907- 1909	160	16-4	13-6	2	398	700	12	..	7	24	..
Fructidor, Vendémiaire, ..													
Bumaire, Frimaire ..													
Papin, Fresnel, ..	Rocheport ..	Bldg. 1908	160	16-4	13-6	2	398	700	12	..	7	24	..
Berthelot ..													
Monge, Ampère, ..	Toulon ..	1908 & Bldg.	160	16-4	13-6	2	398	700	12	..	7	24	..
Gay-Lussac ..													
Q 70-74† (5) ..	Cherbourg ..	Pro.	160	16-4	13-6	2	398	700	12	..	7	24	..
Q 75-79† (5) ..	Rocheport ..												
Q 80-89† (10) ..	Toulon ..												
Q 90-99† (10) ..	Toulon, Cherb.	Pro.											
Q 100-110† (11) ..		Pro.											
A† ..	Cherbourg ..	Bldg.	197				577-810		10-15	..	..	..	..
B† ..	Cherbourg ..	Bldg.	210				530-623		10-15	..	..	..	..
C† ..	Rocheport ..	Bldg.	184				550-735		10-15	..	..	..	..

† Submersibles.

Germany.

Name or Number.	Where built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament	Torpedo Tubes.	Complement	Coal Capacity.
			Length.	Beam.	Draught.								
DESTROYERS—													
D 3, D 4 (2 boats)	Elbing ..	1888	184	21'8	9'6	2	300	2,000	20	{ 4 6-pr. Q.F. 2 1-pr. revs. }	3	48	90
D 5, D 6 (2 boats)	Elbing ..	1888-9	190'3	23	9'6	2	320	3,000	22½	{ 4 6-pr. Q.F. 2 1-pr. revs. }	3	48	90
D 7, D 8 (2 boats)	Elbing ..	1890	190'3	23	9'9	2	380	3,500	22½	{ 6 Q.F. 6 Q.F. }	3	52	80
D 9	Elbing ..	1894	197'0	24'3	9'9	2	380	4,500	26	{ 5 3-pr. Q.F. 1 12-pr. }	3	59	40
D 10	Chlawick ..	1898	211'9	19'6	8'1	2	310	5,800	28'5	{ 5 6-pr. }	2	59	40
D 11, D 12	Chlawick ..	1900	218'6	20'9	8'7	2	333	7,000	31	{ 5 6-pr. }	2	59	40
S 90-101 (12 boats)	Elbing ..	1900	200	23	8'9	2	350	6,000	27'5	3 3-pr. Q.F.	3	49	100
S 102-107 (6 boats)	Elbing ..	1901	200	23	8'9	2	350	6,000	27'5	3 3-pr. Q.F.	3	49	100
G 108-113 (6 boats)	Kiel(Germania)	1901-2	200	22	8'9	2	350	6,000	29'2	3 3-pr. Q.F.	3	49	100
S 114-119 (6 boats)	Elbing ..	1903	200	23	8'9	2	350	6,000	29'2	3 3-pr. Q.F.	3	49	100
S 120-125 (6 boats)	Elbing ..	1904-5	200	23	8'9	2	350	6,000	29'2	3 3-pr. Q.F.	3	49	100
S 126-131* (6 boats)	Elbing ..	1904-5	205	23	..	2	420	6,000	30	3 6-pr.	3	56	100
G 132-136 (5 boats)	Kiel (Germania)	1906	207'4	23	8'9	2	420	6,500	28	4 6-pr.	3	..	..
G 137	Kiel(Germania)	1907	226'4	25'4	9'8	3	570	10,000	32	114-pr.33-pr.	3	72	170
S 138-149 (12 boats)	Elbing ..	1906-7	331	25'7	8'9	2	530	10,000	30	114-pr.33-pr.	3	72	170
V 150-161 (12 boats)	Stettin (Vulcan)	1907-8	269	25'7	10'0	2	670	10,500	30	2 14-pr., 2 M.	3	83	175
V 162-164 (3 boats)	Stettin (Vulcan)	Bldg. ..	..	..	..	..	616	12,000	30	..	..	..	..
S 165-168 (4 boats)	Elbing ..	Bldg. ..	..	..	..	..	616	12,000	30	..	..	..	..
G 169-173 (5 boats)	Kiel(Germania)	1908 & b.	..	..	..	..	616	12,000	30	..	..	..	..
Taku (ex Hai Ying)	Elbing ..	1898	183'7	21'0	..	2	280	6,000	30	6 3-pr.	2	..	67
FIRST CLASS—													
S 42—S 65 (24 boats)	Elbing ..	1892	150	15'6	6'7	..	85-88	1,600	20-22½	2 1-pr. revs.	2	..	17
S 66—S 73 (8 boats)	Elbing ..	1893	154'3	16'4	..	2	{ 110) (145) }	1,600	..	..	3	..	..
S 74—S 87 (14 boats)	Elbing ..	1894-8	158'2	16'9	9'0	2	140	2,300	26	2 1-pr. revs.	3	..	32
G 88—G 89 (2 boats)	Kiel(Germania)	1898	154'3	16'5	..	..	160	2,500	26	2 mach.	3	22	..

The Estimates of 1909 provide for the building of two divisions of destroyers (12 boats). A submarine boat (U 1), 180 tons, 128 ft. long, 8 ft. 10 in. beam, submerged displacement 240 tons, speed 12 and 9 knots, launched at the Germania Yard, August 30, 1905; U 2 launched (Danzig Dockyard) 1908; U 3 and U 4 in hand at Danzig; U 5-U 8 building at the Germania Yard.

* S 125 and G 137 have Parsons turbines.

Greece.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
DESTROYERS—													
Naukratoussa	Yarrow ..	1906	220	20·6	7·2	2	350	..	{ Knots. 32·1 31·79 31·84 32·53 }	2 12, 4 6-pr.	2	58	80
Thyella													
Sfendoni													
Lonchi													
Nike	Stettin (Vulkan)	1906	220	20·6	7·2	2	350	..	30	2 12, 4 6-pr.	2	58	80
Storm													
Aspis													
Doxa													
Velos	Stettin ..	1885	128	15·3	5·4	1	85	1,050	19	4 1-pr. revs.	..	20	20
Zolbeis													
6 boats	Yarrow ..	1881	100	12	4·2	1	48	600	19	2 1-pr. revs.	2	12	9

Italy.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
DESTROYERS—													
Fulmine	Sestri (Odoro)	1898	200	20·4	5·4	2	298	4,800	28	{ 1 12-pr. 3 6-pr. Q. F. }	3	43	60
Lampo													
Freccia													
Dardo													
Strale	{ Elbing (Schichau)	{ 1899 1901 }	196·8	21·3	5·8	2	320	6,000	30	{ 1 12-pr. Q. F., 5 6-pr. }	2	53	60
Euro													
Ostro													
Nembo													
Turbine	{ Naples (Pattison)	{ 1901 1902 }	210	19·4	7·6	2	330	6,000	30	{ 1 12-pr. Q. F., 5 6-pr. }	2	53	64
Aquilone													
Borea													
Meteoro													
Tuono													

Italy—continued.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial-Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
DESTROYERS—contd.													
Zeffireo	{ Naples }	1901	210	19'4	7'6	2	330	6,000	30	{ 1 12-pr. Q.F., 5 6-pr. }	2	53	60
Espero	{ Pattison }												
Orione	{ Genoa }	{ 1905 }	213'6	20'0	7'6	2	325	6,000	28½	6 6-pr.	3		40
Oraa	{ Ansaldo }	{ 1906 }											
Olympia													
Orfeo													
Bersagliere	{ Genoa }	{ 1906 }	211'6	20'0	7'6	3	380	6,000	30	4 12-pdr.	3	55	82
Artigliere	{ Ansaldo, }	{ 1907 }											
Granatiere	{ Armstrong }												
Lanciere													
FIRST CLASS—													
Aquila													
Sparviero	Elbing ..	1888	152	17'2	7'9	2	130	2,200	26'6	{ 2 3-pr. Q.F., 1 1-pr. Q.F., 1 1-pr. rev. }	3	24	40
Nibbio													
Avvoltoio													
Falco													
Pellicano	Seatri (Odero)	1899	157'4	19	14'8	2	147	2,700	25	2 3-prs.	2	28	24
Condore	Seatri (Ansaldo)	1898	154'3	16'8	6'9	2	138	2,500	27	2 3-prs.	2	27	16
Sirio		{ 1905 }											
Sagittario		{ 1906 }											
Spica	Elbing ..	{ 1906 }					215						
Scorpione		{ 1906 }											
Serpente		{ 1905 }											
Saffo		{ 1906 }											
Alcione													
Ardea													
Albatros	Odero ..	{ 1905 }											
Alorone		{ 1906 }											
Astore													
Arpia													
Gabbiano	Spezia ..	1907											
Pegaso	{ Naples }	1905											
	{ Pattison }												
Persao		1905											
Prodone		1905	164	17'4	7'0	2	200	3,000	{ 25'4 26'6 }	3 3-pr.	3		40
Pallade													
Cigno													
Castropea	{ Naples }	1906											
Calliope	{ Pattison }	1907											
Clio		1906											
Centauro		1907											
Canopo		1907											
Calipso	{ Naples }	Bldg.											
Climene	{ Pattison }	Bldg.											
SECOND CLASS—													
No. 117 .. .. .	..	1895	131'2	16'4	..	1	85	1,000	..	2 1 pr. Q.F.	2	17	17
Nos. 136-8, 140-2	Italy ..	1893-94	131'2	16'4	..	1	85	1,000	22	2 1-pr. Q.F.	2	17	17
(6 boats)													
Nos. 147-152 (6 boats)	Italy ..	1894-5	131'2	16'4	..	1	85	1,000	22	2 1-pr. Q.F.	2	17	17
SUBMARINE—													
Delfino	Spezia ..	1894	78'6	10'1	..	1	111	150	10-12	..	2	12	..
Gianco, Squalo,													
Narvalo, Otaria,	{ Venice, &c. }	1906	120	14'3	..	..	{ 180 230 }	..	15	..	2	..	..
Tricheco		1907					{ 180 230 }	..					
Foca and 6 others ..	Muggiano ..	1908	137'9	14'3	..	..	{ 230 }	..	10-15	..	2	..	..

Four destroyers Artigliere type provided for. The new Italian destroyers have Thornycroft water-tube boilers.

Japan.

Name or Number.	Where Built.	Launched.	Dimensions			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
DESTROYERS—													
Murakumo	Thornycroft	1898											
Shimonome	Thornycroft	1898											
Yugiri	Thornycroft	1898											
Shiranui	Thornycroft	1899	210·0	19·5	7·2	2	307	5,800	{ 30 to 31 }	{ 1 12-pr., 5 6-prs. }	2	54	80
Kagerou	Thornycroft	1899											
Usugumo	Thornycroft	1900											
Shirakumo	Thornycroft	1901											
Asashio	Thornycroft	1902	216·7	20·7	8·3	2	373	7,400	31	{ 1 12-pr., 5 6-prs. }	2	59	96
Ikadouchi	Yarrow ..	1898											
Inadsuma	Yarrow ..	1899											
Akebono	Yarrow ..	1899	220·0	20·6	9·6	2	311	6,000	31	{ 1 12-pr., 5 6-prs. }	2	55	95
Sazanami	Yarrow ..	1899											
Oboro	Yarrow ..	1899	220·3	20·6	9·6	2	311	6,000	31·62	{ 1 12-pr., 5 6-prs. }	2	..	90

Japan—continued.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
DESTROYERS—contd.													
Niji	Yarrow ..	1899	220·3	20·6	9·6	2	308	6,000	31·15	{ 1 12-pr., 5 6-prs. }	2	..	90
Kasumi	Yarrow ..	1902	220·3	20·6	9·6	2	335	6,000	31	{ 1 12-pr., 5 6-prs. }	2
Asagiri	Yokosuka ..	1902	220·3	20·6	9·6	2	374	6,000	29	{ 1 12-pr., 5 6-prs. }	2
Hurusame	Yokosuka ..	1902											
Murasame	Yokosuka ..	1902											
Yamahiko	Port Arthur	1903											
Fumizuki	Port Arthur	1903											
Satsuki	St. Petersburg	1902											
Hatsushima	Yokosuka ..	1905											
Yayoi	Yokosuka ..	1905											
Kisaragi	Yokosuka ..	1905											
Hibiki	Yokosuka ..	1906											
Wakaba	Yokosuka ..	1905											
Hatsuyuki	Yokosuka ..	1906											
Kamikaze	Yokosuka ..	1905											
Ariake	Yokosuka ..	1905											
Fubuki	Yokosuka ..	1905											
Arafe	Yokosuka ..	1905											
Yunagi	Maizuru ..	1906											
Oite	Maizuru ..	1905											
Asakase	Kobe	1905											
Harukase	Kobe	1905											
Shigure	Kobe	1906											
Hatsuharu	Kobe	1906											
Yuguri	Sasebo	1905											
Yudachi	Sasebo	1906											
Mikadzuki	Sasebo	1906											
Nowake	Sasebo	1906											
Uchida	Kure	1905											
Nenohi	Kure	1905											
Shiratsuyu	Nagasaki ..	1906											
Shirayuki	Nagasaki ..	1906											
Matsukase	Nagasaki ..	1906											
Shirotake	Nagasaki ..	1906											
Asatsuyu	Osaka	1907											
Hayakase	Osaka	1906											
Kikutsuki	Uraga	Bldg.											
Minatsuki	Uraga	Bldg.											
Nagatsuki	Uraga	1907											
Utsuki	Uraga	1907											
Ironami	Bldg.												
Uranami	Bldg.												
Ajanami	Bldg.												
FIRST CLASS—													
Hayabusa	Normand ..	1898	147·7	16·0	8·2	2	150	4,200	30	{ 1 6-pr., 2 3-prs. }	3	26	30
Kasasagi	Normand ..	1899											
Manadzuru	Normand ..	1899											
Chidori	Normand ..	1900											
Shirataka	Elbing	1899											
Aotaka	Kure	1903											
Hato	Kure	1903											
Hibari	Kure	1903											
Kari	Kure	1903											
Kiji	Kure	1903											
Tsubame	Kure	1903											
Hashitaka	Kawasaki ..	1902											
Kamome	Kure	1904											
Otori	Kawasaki ..	1904											
Sagi	Kure	1902											
Uzuri	Kure	1902											
Fukuriu	Kiel	1895											
SECOND CLASS—													
2 boats	Kobe	1901	83
10 boats	Yarrow ..	1900	152·6	15·3	7·9	1,900	27	2 3-prs.	3	..	36
16 boats	Elbing	1891-9
1 boat (No. 24) ..	Normand ..	1891	118	13·1	6·9	1	80	1,200	23	2 1-prs.	2	21	10
2 boats	Normand ..	1898	121·4	13·6	8·6	1	86	1,800	27	1 3-pr.	2	..	10
SUBMARINES—													
5 boats	[U.S.A. Fore River,	1904-5	65	12	120	..	8	..	1
2 boats	Japan	1906	60·80	1
2 boats	Vickers ..	1908	135	13·5	325	..	14	..	2
5 boats	Japan	Bldg.

A destroyer of 1100 tons and 4 of 790 tons, 34 knots, are said to be building in Japan.

Mexico.

Mexico has four first-class boats building or projected.

Netherlands.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
FIRST CLASS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Ardoeno	Yarrow ..	1886	125	13	6	1	83	80	21	2 1-prs.	2	16	10
Batok	Amsterdam	1887	125	13	6·9	1	83	725	20	2 1-prs.	2	16	10
Cycloop	Amsterdam	1887	125	13	6·9	1	83	680	20	2 1-prs.	2	16	10
Dempo	Amsterdam	1887	125	13	6·9	1	83	760	20	2 1-prs.	2	16	10
Empong	Yarrow ..	1888	128	13	6·2	1	91	1,100	24·1	2 1-prs.	3	16	15
Etna	Yarrow ..	1882	100	12·6	5·6	1	45	550	21·5	2 1-prs.	2	16	7
Foka	Amsterdam	1888	128	13	6·2	1	90	1,000	22·1	2 1-prs.	3		
Goentoer	Amsterdam	1888	128	13	6·2	1	90	950	21	2 1-prs.	3		
Habang	Amsterdam	1888	128	13	6·2	1	90	930	21·7	2 1-prs.	3		
Hekla	Yarrow ..	1882	100	12·6	5·6	1	45	550	21·5	2 1-prs.	2	16	7
Idjen	Amsterdam	1889	128	13	6·2	1	90	840	20·6	2 1-prs.	3		
Krakatau	Amsterdam	1889	128	13	6·2	1	90	750	19·1	2 1-prs.	3		
Lamongau	Amsterdam	1890	104·5	13·3	5·2	1	50	790	20·7	2 1-prs.	2		
Makjan	Amsterdam	1890	104·5	13·3	5·2	1	50	790	20·7	2 1-prs.	2		
Nobo	Amsterdam	1890	104·5	13·3	5·2	1	50	790	20·7	2 1-prs.	2		
Scylla	Yarrow ..	1900	130	13·6	6·0	1	77	1,200	24·3	2 1-prs.	3	18	20
Hydra	Yarrow ..	1900	130	13·6	6·0	1	77	1,200	24·4	2 1-prs.	3	18	20
Ophir	Yarrow ..	1901	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Pangrango	Yarrow ..	1901	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Rindjani	Yarrow ..	1901	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Smeres	Fijenoord ..	1904	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Tangka	Fijenoord ..	1904	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Wajang	Fijenoord ..	1904	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Minotaurus, Python	Flushing ..	1901	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	3	25	36
Zeeslang													
Krokochl													
Draak	Flushing ..	1905	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Slinx													
Scylla													
Melindert Jentjes ..	Flushing, } Rotterdam, } & Fijenoord }	1904	154·3	16·5	7·9	1	144	2,000	25	2 3-prs.	3	24	..
Johan van Brakel ..													
Van de Rijn													
Willem Willemsze ..													
Roemer Vlacq													
Pieter Constant ..	Do... ..	1906	154·3	16·5	7·9	..	144	2,000	..	2 3-prs.	3	24	..
Jacob Cleydijk ..													
Janssen de Haan ..													

All the Poplar destroyers have Yarrow water-tube boilers, and the later ones are fitted for the consumption of oil fuel. One submarine boat, Luctor at Emergo (120 tons). Another is to be laid down.

Norway.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Valkyrien	Elbing ..	1896	190	24·3	9·3	1	374	3,300	23·2	{ 2 12-pdrs. 4 1-pdrs. }	2	59	90
Draug	Christiania..	1903	226	25·0	..	2	550	7,500	27·0	6 12-pdrs.	3	71	95
Troll	Christiania..	Bldg.											
FIRST CLASS—													
Varg (8), Raket (9)	Christiania..	1894	111·5	12·4	..	1	43	..	..	..	2	..	..
Hval, Delfin, Hal (3 boats)	Elbing ..	1896	128·0	15·0	6·9	1	84	1,100	24·5	21·4-in. Q.F.	2	..	..
Storm, Brand, Trold	Christiania..	1899	123·0	15·0	..	1	84	1,100	23	21·4-in. Q.F.	2	..	..
Laks, Sild, Sael, Skrei	Christiania ..	1900	128·0	15·0	6·9	1	84	11,000	23	2 1·4-in.	2	..	..
Kjeck, Hvas, Dristig, Kvik, Djerv, Blink, Glint, Hauck, Falk	Christiania ..	1898 1903	111·5	14·5	6·3	1	65	650	19	2 1·4-in.	2	..	..
Skarv, Teist, Lom, Jo, Grib	Christiania ..	1906-7	134·5	14·9	..	1	100	1,700	25·0	2 3-pr.	..	..	..
Ravn, Orn	Christiania ..	1903	119	14·9	6·4	1	73	1,035	22·5	2 1·4-in.	2	14	13

A submarine (250 tons) in hand at the Germania Yard, Kiel. Provision is made for several more.

Portugal.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
5 boats (5-9)	Elbing ..	1890-92											
Mineiro	Lisbon ..	1893	..	..	..	..	..	..	12				
SUBMARINE—													
Plongeur	Lisbon ..	1892	72·1	11·5	..	..	100	..	6		4	6	

Roumania.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length	Beam.	Draught.								
FIRST CLASS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Naluka	Havre	1888	120·7	11·3	6·9	1	56	578	21	1 1-pr. rev.	2	..	12
Sborul	Havre	1888	120·7	11·3	6·9	1	56	578	21	1 1-pr. rev.	2	..	12
Smeul	Havre	1888	120·7	11·3	6·9	1	56	578	21	1 1-pr. rev.	2	..	12
SECOND CLASS—													
Sotmul	Yarrow	1882	63	8	3	1	12	150	16·5	..	..	8	
Vulturul	Yarrow	1882	63	8	3	1	12	150	16·5	..	..	8	

8 100 ft. Torpedo Védette Boats built by the Thames Ironworks. 4 built by Schichau, 1904.

Russia.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length	Beam.	Draught.								
BALTIC SEA.			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
DESTROYERS—													
Kondratenko, Okhotnik, Pogranitschnik, Sibirskij-Strelak .. .	{ Abo and Helsingfors }	1905	250·3	27·0	8·9	2	625	7,300	25-26	{ 2 12-pdrs. } { 6 6-pdrs. }	3	100	191
Amurets, Gaidamak, Usuriets, Voadnik, Kuzir, Bukharsky, Dobrovolets, Finn, Moskviyanka .. .	{ Kiel (Germani.) }	{ 1905 } { 1906 }	232·9	23·7	7·9	2	560	6,500	25-26	{ 2 12-pdrs. } { 6 6-pdrs. }	3	98	180
Donskoi - Kasak, Kasanetz, Sabalka, Iets, Steregushchi, Strashny, Trukhmenets - Stavropolaki, Ukraina, Volkovoi, Prytki .. .	Helsingfors	1905	238	27·0	8·6	2	580	6,500	25-26	{ 2 12-pdrs. } { 6 6-pdrs. }	3	98	134
Revy, Retivy, Ryany, Reziy, Proserlity, Pliky, Ridny, Pochuchny, Protchny, Poratschichi, Frontsitelny, Podvitsny, Bravi, Vidny, Bodry .. .	Riga .. .	{ 1904 } { 1906 }	239·9	23·7	7·6	2	508	{ 6,200 } { 7,020 }	25-27	{ 2 12-pdrs. } { 4 6-pdrs. }	2	90	{ 50 } { 120 }
Grozni, Grosiashtchi, Tverdy, Totachny, Trevosny .. .	Poplar .. .	1895	190	18·6	7·0	2	240	4,400	29·7	1 12-pr, 3 3-pr	2		
Iskousny, Ispolnitelni, Kriepky, Legky, Lovki, Letutshi, Lichol .. .	{ Abo, Ishora & Nevsky .. }	1898	196·9	18·4	11·5	2	240	3,800	27	1 12-pr, 3 3-pr	2	55	53
Bolevoi, Bditelny, Burni, Vnmatelni, Vnuhshtelni, Vynoslivny, Sergieff, Yurasovsky, Sviereff, Dmitrieff .. .	{ Nevsky and Ishora .. }	1900-2	196·9	18·4	11·5	2	350	6,000	27	1 12-pr, 5 3-pr	3	62	80
Slini, Storashevoi, Stoiny, Rasyashtshy, Rastoropyny, Hurakoff, Dyelni, Dostoiny, Deyatelni, Myetky, Molodetsky, Moshtahny, Malleieff, Anastasoff .. .	St. Petersburg	1904	196·9	18·4	11·5	2	350	6,000	27	1 12-pr, 5 3-pr	3	62	80
Aspen .. .	Abo .. .	1905	196·9	18·4	11·5	2	240	6,000	27	1 12-pr, 5 3-pr	3	62	80
Domenes .. .	La Seyne ..	1905	185·9	21·0	7·5	2	324	5,600	26	{ 1 12-pr, 5 3-pr } 2 M	2	60	{ 30 } { 100 }
Hogland .. .	{ Havre (Normand) }	1905	185·8	21·0	7·5	2	324	5,600	27·5	{ 1 12-pr, 5 3-pr } 2 M	2	60	{ 30 } { 100 }
Nargen .. .	{ Kibing Schichau }	1905-6	208·9	23·0		2	365	6,500	28		3		85
Rochensalm .. .	{ St. Petersburg and Ochta }	{ 1905 } { 1907 }	185·9	21·0	7·5	2	335-56	5,600	26	{ 1 12-pr, 5 3-pr } 2 M	2	60	{ 30 } { 100 }
Sestoresak .. .													
Transund .. .													
2 boats .. .	Ishora .. .	1895	127·9	15·7	6·9	1	98	1,250	21	..	2	..	17
6 boats .. .	Putiloff ..	1895	127·9	15·7	6·9	1	98	1,250	21	..	2	..	17
8 boats .. .	Ishora .. .	1894	128	16	6·9	1	85	1,200	22	2 1-pra.	2	13	17
	Ishora .. .	1894	128	16	6·9	1	85	1,200	22	2 1-pra.	2	13	17
	Putiloff ..	1890	136·5	13	7·8	..	81	1,100	21	..	..	..	..
	Normand ..	1894	118	13·2	8·6	1	80	1,300	24	2 1-pra.	2	21	10
	Ishora .. .	1895	127·9	15·7	6·9	1	98	1,250	21	..	2	..	17
	St. Petersburg	1896	128	16	6·9	2	85	1,200	22	2 1-pra.	2	13	17
	St. Petersburg	1897	138	14·7	9·9	2	120	..	25	..	2	26	
	Nevsky .. .	1898	..	..	..	..	118	..	..	..	..	..	..

19 other boats, built in 1890-95.

Russia—continued.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
BLACK SEA.													
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
DESTROYERS— Baranoff, Shestakoff, Pustchin, Sazarenyy, Zavidni, Zavettin, Zharki, Zhutki, Zhivoli, Zhivulka, Zhivutshy ..	Nicolaiëff ..	1907-8	241·6	27·0	7·9	2	614	6,500	25	6 12-pdrs.	3	90	200
Stremittelni, Strogli, Smetlivy, Svirepy, Zadorni, Zorki, Zvonki	Nicolaiëff ..	1903-4	210	21·2	7	2	350	6,500	27	1 12-pr, 5 3-pr	2	..	60
FIRST CLASS— A. B. C. (3 boats) ..	Nicolaiëff ..	1893	126	..	..	..	81	..	21	..	..	..	..
Adler	Elbing ..	1890	152·0	17·2	7·9	2	130	2,200	27·4	2 1-prs.	3	24	40
Anakria	Elbing ..	1890	128·0	16	6·9	1	85	1,200	22	2 1-prs.	2	13	17
Anapa	Odessa ..	1891	126	13	8·5	1	81	1,100	21	2 1-pr. revs.	2	13	..
Altodorj	Odessa ..	1891	126	13	8·5	1	81	1,100	21	2 1-pr. revs.	2	13	..
D. E. (2 boats) ..	Sebastopol ..	1893	128	..	..	..	85	..	22	..	..	..	..
FAR EAST.													
DESTROYERS—													
Bespochtchadni, Bes- trachni, Beschumni (3 boats)	Elbing ..	1899	196·9	18·4	11·5	1	350	6,000	27	1 12-pr, 5 3-pr	2	..	80
Grozovol, Vlastni ..	Havre(F.&C.)	1900-2	186·0	20·8	10·3	2	300	5,000	28	1 12-pr 5 3-pr	2	..	80
Boiki	Nevsky ..	1900	196·9	18·4	11·5	1	350	6,000	28	1 12-pr, 5 3-pr	2	..	80

Submarine Plotr Koschka (experimental), Delfin (77 ft., 175 tons), Graf Sheremeteff completed at St. Petersburg; Akula, Alligator, Drakon, Kalman, Krokodil, Minoga (400 tons, Lake type) building; also Kefal, Akula, Makrel, Rytschok, Nalina, Kata, Paltus, Delfin, Karp, Kambala, Karas (240 tons) built at Kiel; Bialuga, Pescar, Sitshuka, Som, Sterliad; 13 others built or building, Lessos in the Black Sea.

Spain.

Name or Number.	Where Built.	Launched.	Dimensions.				Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.	Number of Screws.							
DESTROYERS—													
Terror	Clydebank ..	1896	Feet. 220	Feet. 22	Feet. 5·6	2	Tons. 300	6,000	Knots. 28	{ 2 12-pr. 2 6-pr. 21-pr. }	2	67	Tons. 100
Aulaz	Clydebank ..	1897	225	25·6	5·8	2	400	7,500	30	{ 2 14-pr. 2 6-pr. 21-pr. }	2	70	90
Osado													
Proserpina													
FIRST CLASS—													
Acevedo	Chiswick ..	1885	117·7	12·5	6·2	1	63	660	20·1	2 mach.	2		
Azor	Poplar ..	1887	134·5	14	6	1	108	1,600	24	4 3-pr. Q. F.	3	23	25
Bustamante	Normand ..	1887	126	10·9	..	..	63	800	..	3 3-pr.	2		
Habana	Chiswick ..	1887	127·5	12·5	6	1	59	730	21·3	1 mach.	2		
Halcón	Poplar ..	1887	134·5	14	..	1	108	1,600	24	4 3-pr. Q. F.	3	23	25

Azor, Halcón and Orion re-boilered by Yarrow (water-tube).

The programme includes 3 destroyers of 35 tons and 24 torpedo boats of 180 tons.

Sweden.

TORPEDO BOATS.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
DESTROYER—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Mode	Yarrow ..	1902	220·3	20·6	8·9	2	400	6,800	32·4	{ 1 12-pr. 5 6-prs.	2	55	95
Magne	Thornycroft	1905								{ 1 12-pr. 5 6-prs.	2	59	96
Wale	Malmö ..	1906	216·7	20·0	7·2	2	350	7,400	31·2	{ 1 12-pr. 5 6-prs.	2	59	96
Ragnar	Malmö ..	Bldg.								{ 2 12-prs. 4 6-prs.	..	..	..
Sigurd	Gothenburg	Bldg.	216·9	20·8	8·2	2	430	7,200	30·0	{ 2 12-prs. 4 6-prs.	..	..	..
Vidar	Malmö ..	Bldg.											
FIRST CLASS—													
Komet	Elbing ..	1896	128	15·9	6·11	1	92	1,056	23·0	2 1·9-in. Q.F.	2	16	17
Blitz	Carlskrona..	1898	128	15·9	6·11	1	92	1,260	23·6	2 1·9-in. Q.F.	2	18	17
Meteor	Carlskrona..	1899	128	15·9	6·11	1	92	1,330	23·8	2 1·9-in. Q.F.	2	18	17
Stjerna	Carlskrona..	1899	128	15·9	6·11	1	92	1,250	23·4	2 1·9-in. Q.F.	2	18	17
Orkan	Carlskrona..	1900	128	15·9	6·11	1	92	1,250	23·5	2 1·9-in. Q.F.	2	18	17
Vind	Carlskrona..	1900	128	15·9	6·11	1	92	1,250	23·5	2 1·9-in. Q.F.	2	18	17
Bris	Carlskrona..	1900	128	15·9	6·11	1	92	1,250	23·5	2 1·9-in. Q.F.	2	18	17
Virgo	Carlskrona..	1902	128	15·9	6·11	1	92	1,250	23·5	2 1·9-in. Q.F.	2	18	17
Mira	Carlskrona..	1902	128	15·9	6·11	1	92	1,250	23·5	2 1·9-in. Q.F.	2	18	17
Orion													
Sirius	Carlskrona..	1903	128	15·9	6·11	1	92	1,250	23·5	2 1·9-in. Q.F.	2	18	17
Kapella													
Pleiad	Normand ..	1905	125	15	6·6	1	96	1,900	26	2 1·5-in. Q.F.	2	18	—
Vega	Carlskrona..	Bldg.	125	17·5	8·6	1	105	1,900	25·5	{ 1 6-pr. 1 1·4-in.	2	..	..
Vesta										{ 1 6-pr. 1 1·4-in.	2	..	..
Spica, Astrea, Iris, Thetis	(Bergsund and Gothenburg)	Bldg.	125	17·5	8·6	1	105	1,900	25·5	{ 1 6-pr. 1 1·4-in.	2	..	..
Altair													
Antares													
Argo	Stockholm ..	1908	128	17·5	8·6	..	110	..	25·5	2 6-prs.	2	18	..
Arcturus													
2 boats (9 and 11) ..													
SECOND CLASS—													
No. 75	Stockholm ..	1892	100·5	11·6	6·3	1	49	460	18·9	1 mach.	2	14	9
No. 77	Carlskrona..	1891	100·5	11·6	6·3	1	49	460	18·9	1 mach.	2	14	9
No. 79	Stockholm ..	1902	104·0	12·5	6·1	1	49	..	..	1 1·5-in. Q.F.	2	14	..
No. 81	Stockholm ..	1902	104·0	12·5	6·1	1	49	..	..	1 1·5-in. Q.F.	2	14	..
No. 83	Stockholm ..	1903	104·0	12·5	6·1	1	49	..	..	1 1·5-in. Q.F.	2	14	..
No. 85	Stockholm ..	1903	104·0	12·5	6·1	1	49	..	..	1 1·5-in. Q.F.	2	14	..
THIRD CLASS—													
No. 141, 143, 145, 147, 149 (5 boats) ..	Stockholm ..	{ 1879 1890}	55·0	10·7	4·1	2	21	80	10	..	2	..	1·5
SUBMERSIBLES—													
Enroth	Stockholm ..	1902	82·0	13·0	11·6	2	146	100	12-11	..	1	..	..
Hajen	Stockholm ..	1903	65·0	11·6	..	..	120	200	10-7	..	..	..	..
Hvalen	Muggiano ..	1908	139·6	14·2	6·9	..	180-230	750	16-7	..	2	15	..

Provision was made for three destroyers and six torpedo boats in 1907-8. Other submarines are provided for.

Turkey.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Berk-Eshan	Kiel	1894	187	21·6	..	2	270	1,200	26	6 1-pr. revs.	2	..	..
Tajdar	Kiel	1894	187	21·6	..	2	270	..	26	6 1-pr. revs.	2	..	..
Samsoun													
Basra	Bordeaux ..	Bldg.	184·9	19·6	9·6	2	280	..	28	{ 1 9-pr. 6 3-pr.	2	..	26
2 others													
FIRST CLASS—													
Ellagot, Ac-Hisar ..	Sestri Ponente	1904	165·8	18·6	4·5	..	165	2,200	27				
Angora, Urfa, Antalia, Tokat, Deradj, Kulahia, Mossul..	Sestri Ponente	1906	165·8	18·6	4·5	..	165	2,200	24				
A. B.	Sestri Ponente	1901	166	18·6	4·0	2	145	2,400	26	2·1 pr.	2	..	16
Kidjer (No. 10) ..	Kiel	1890	162·7	18·9	7·4	2	180	2,200	23	5 3-prs. Q.F.	2	..	..
5 boats	Kiel	1889-90	126·7	15·4	8·6	1	85	1,300	22	2 1-pr. revs.	2	21	8
2 boats	Kiel	1892	127	..	..	..	..	..	22				

Four torpedo boats have been ordered in France.

United States.

Name.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.		Complement.	Maximum Gun Capacity.
			Length.	Beam.	Draught.					Guns.	Torpedo Tubes.		
			ft. in.	ft. in.	ft. in.		Tons.		Knots.				Tons.
DESTROYERS—													
Bagley	Bath	1900	157 0	17 0	4 7	2	167	3,920	28	3 3-pr.	3	29	..
Barney	Bath	1900	157 0	17 0	4 7	2	167	3,920	28	3 3-pr.	3	29	..
Biddle	Bath	1900	157 0	17 0	4 7	2	167	3,910	28	3 3-pr.	3	29	..
Blakely	Boston	1902	175 0	17 6	4 8	2	165	3,000	26	3 3-pr.	3	29	70
De Long	Boston	1901	175 0	17 6	4 8	2	165	3,000	26	3 3-pr.	3	29	70
Du Pont	Bristol, R.I.	1897	175 0	17 6	4 8	2	165	3,400	28 58	4 1-pr.	3	32	76
Foote	Baltimore ..	1896	160 0	16 1	5 0	2	142	2,000	24 5	3 1-pr.	3	24	44
Nicholson ..	Elizabethport	1902	174 6	17 0	4 6	2	174	3,500	26	3 3-pr.	3	29	..
O'Brien	Elizabethport	1902	174 6	17 0	4 6	2	174	3,500	26	3 3-pr.	3	29	..
Porter	Bristol, R.I.	1896	175 0	17 8	4 8	2	165	3,000	28 63	4 1-pr.	3	32	76
Rodgers	Baltimore ..	1896	160 0	16 1	5 0	2	142	2,000	24 5	3 1-pr.	3	24	44
Rowan	Seattle, Wash.	1898	170 0	17 0	5 11	2	182	3,200	28	4 1-pr.	3	32	60
Shubrick	Richmond ..	1899	175 0	17 6	4 8	2	165	3,000	26	3 3-pr.	3	29	70
Stockton	Richmond ..	1899	175 0	17 6	4 8	2	165	3,000	26	3 3-pr.	3	29	70
Thornton	Richmond ..	1900	175 0	17 6	4 8	2	165	3,000	26	3 3-pr.	3	29	70
Tingey	Baltimore ..	1902	175 0	17 6	4 8	2	165	3,000	26	3 3-pr.	3	29	70
Wilkes	Morris Heights	1901	175 0	17 6	4 8	2	165	3,000	26 25	3 3-pr.	3	29	70
Winslow	Baltimore ..	1897	160 0	16 1	5 0	2	142	2,000	24 5	3 1-pr.	3	24	44
H. Paulding ..	Bldg. .. ..	..	..	..	..	2	742	13,000	30	..	..	..	..
P. Drayton ..	Bldg. .. ..	..	..	..	..	2	742	13,000	30	..	..	..	..
F. A. Roe	Bldg. .. ..	..	..	..	..	2	742	13,000	30	..	..	..	..
E. Terry	Bldg. .. ..	..	..	..	..	2	742	13,000	30	..	..	..	..
G. H. Perkins..	Bldg. .. ..	..	..	..	..	2	742	13,000	30	..	..	..	..
A. Sterrett ..	Bldg. .. ..	..	..	..	..	2	742	13,003	30	..	..	..	..
E. R. McCall ..	Bldg. .. ..	..	..	..	..	2	742	13,000	30	..	..	..	..
W. Barrows ..	Bldg. .. ..	..	..	..	..	2	742	13,000	30	..	..	..	..
L. Warrington	Philadelphia	1889	289 0	27 0	..	2	742	13,000	30	..	..	..	..
J. Mayrant ..	Philadelphia	1889	289 0	27 0	..	2	742	13,000	30	..	..	..	..
J. B. Smith ..	Philadelphia	1909	289 0	27 0	..	2	700	10,000	28	5 12-pr.	..	..	..
R. H. Lamson ..	Philadelphia	1909	289 0	27 0	..	2	700	10,000	28	5 12-pr.	..	..	..
S. W. Preston ..	..	..	289 0	27 0	..	2	700	10,000	28	5 12-pr.	..	..	..
C. W. Flusser ..	..	..	289 0	27 0	..	2	700	10,000	28	5 12-pr.	..	..	..
S. C. Reid .. ..	..	..	289 0	27 0	..	2	700	10,000	28	5 12-pr.	..	..	..
SEA-GOING—													
Bailey	Morris Heights	1899	205 0	19 0	6 0	2	235	5,000	30	4 6-pr.	2	..	20
Bainbridge ..	Philadelphia	1901	245 0	23 7	6 6	2	420	8,000	29	2 12-pr., 5 6-pr.*	2	64	130
Barry	Philadelphia	1902	245 0	23 7	6 6	2	420	8,000	29	2 12-pr., 5 6-pr.	2	64	130
Chauncey	Philadelphia	1901	245 0	23 7	6 6	2	420	8,000	29	2 12-pr., 5 6-pr.	2	64	130
Cushing	Bristol, R.I.	1890	138 9	14 3	4 11	2	105	1,720	22 5	3 1-pr.	3	23	36
Dale	Richmond ..	1900	245 0	23 7	6 6	2	420	8,000	28	2 12-pr., 5 6-pr.	2	64	130
Dahlgren	Bath	1899	147 0	16 4	4 7	2	146	4,200	30 5	4 1-pr.	2	..	32
Davis	Portland, Ore.	1898	146 0	15 4	5 4	2	132	1,750	22 5	3 1-pr.	3	..	..
Decatur	Richmond ..	1900	245 0	23 7	6 6	2	420	8,000	28	2 12-pr., 5 6-pr.	2	64	130
Ericsson	Dubuque, Iowa	1894	149 7	15 6	4 9	2	120	1,800	24	4 1-pr.	3	23	35
Farragut	San Francisco	1898	213 6	20 8	6 0	2	273	5,600	30	4 6-pr.	2	..	76
Fox	Portland, Ore.	1898	146 0	15 4	5 4	2	132	1,750	22 5	3 1-pr.	3	..	..
Goldborough ..	Portland, Ore.	1902	194 8	20 5	5 0	2	247 5	5,800	30	4 6-pr.	2	..	131
Hopkins	Wilmington	1902	244 0	24 6	6 0	2	408	7,200	29	2 12-pr., 5 6-pr.	2	64	160
Hull	Wilmington	1902	244 0	24 6	6 0	2	408	7,200	29	2 12-pr., 5 6-pr.	2	64	160
Lawrence	Quincy, Mass.	1900	242 3	22 3	6 2	2	400	8,400	30	2 12-pr., 5 6-pr.	2	64	115
Macdonough ..	Quincy, Mass.	1901	242 3	22 3	6 2	2	400	8,400	30	2 12-pr., 5 6-pr.	2	64	115
Morris	Bristol, R.I.	1898	138 3	15 6	4 1	2	105	1,750	24	3 1-pr.	3	..	28
Paul Jones ..	San Francisco	1900	245 0	23 7	6 6	2	420	7,000	29	2 12-pr., 5 6-pr.	2	64	130
Perry	San Francisco	1900	245 0	23 7	6 6	2	420	7,000	29	2 12-pr., 5 6-pr.	2	64	130
Preble	San Francisco	1901	245 0	23 7	6 6	2	420	7,000	29	2 12-pr., 5 6-pr.	2	64	130
Somers	Schleshan ..	1898	149 3 1/2	17 5	..	2	145	..	..	..	..	..	..
Stringham ..	Ebing	1899	225 0	22 0	6 6	2	340	7,200	30	7 6-pr.	2	..	120
Stewart	Wilmington	1902	245 0	23 7	6 6	2	420	7,000	29 3	2 12-pr., 5 6-pr.	2	64	130
T. A. M. Craven	Bath	1899	147 0	16 4	4 7	2	146	4,200	30 5	4 1-pr.	2	..	32
Truxtun	Baltimore ..	1901	248 0	23 3	6 0	2	433	8,300	30	2 12-pr., 5 6-pr.	2	64	232
Whipple	Baltimore ..	1901	248 0	23 3	6 0	2	433	8,300	30	2 12-pr., 5 6-pr.	2	64	232
Worden	Baltimore ..	1901	248 0	23 3	6 0	2	433	8,300	30	2 12-pr., 5 6-pr.	2	64	232

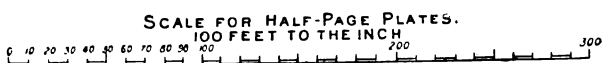
* Guns of destroyers of this class are Driggs Semi-Automatic Quick-Firers.

United States—*continued.*

Name.	Where Built.	Lauuched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Sp. ed.	Armament.			
			Length.	Beam.	Draught.					Guns.	Torpedo Tubes.	Complement.	Maximum Coal Capacity.
THIRD CLASS—			ft. in.	ft. in.	ft. in.		Tons.		Knots.				
Gwin. . . .	Bristol, R.I.	1897	99 6	12 6	3 3	1	46	850	20·88	1 1-pr.	2	..	8
Mackenzie ..	Philadelphia	1898	99 3	12 9	4 3	1	65	850	20	1 1-pr.	2	..	15·3
McKee	Philadelphia	1898	99 3	12 9	4 3	1	65	850	19·82	2 1-pr.	2	..	..
Talbot	Bristol, R.I.	1897	99 6	12 6	3 3	1	46	850	21·15	1 1-pr.	2	..	8·8
SUBMARINE—													
Adder	Elizabethport	1901	63 4	11 9	..	1	120	160	7—8	..	1	..	..
Grampus .. .	S. Francisco	1902	63 4	11 9	..	1	120	160	7—8	..	1	..	..
Holland .. .	Elizabethport	1896	54 0	10 3	..	1	74	150	8	1 dynamite	1	5	..
Moccasin .. .	Elizabethport	1901	63 4	11 9	..	1	120	160	7—8	..	1	..	..
Pike	S. Francisco	1902	63 4	11 9	..	1	120	160	7—8	..	1	..	..
Plunger .. .	Elizabethport	1902	63 4	11 9	..	1	120	160	7—8	..	1	..	..
Porpoise .. .	Elizabethport	1901	63 4	11 9	..	1	120	160	7—8	..	1	..	..
Shark	Elizabethport	1901	63 4	11 9	..	1	120	160	7—8	..	1	..	..
Cuttlefish... }	Quincy, Mass. }	1906	80 6	13 0	..	..	170		8½—10		1	..	..
Viper }	Quincy, Mass. }	1909											
Tarantula... }	Quincy, Mass. }	1909											
Octopus	Quincy, Mass.	1906	106 0	..	..	..	273						

The submarine *Fulton*, of the *Holland* type, built experimentally by the *Holland Company*, was launched June, 1901. The fifteen new submarines are to be named *Slogray*, *Tarpon*, *Bonita*, *Snapper*, *Narwhal*, *Grayling*, *Salmon*, *Carp*, *Barracuda*, *Pickarel*, *Skate*, *Skipjack*, *Sturgeon*, *Thrasher*, and *Tuna*.

PLANS
OF
BRITISH AND FOREIGN SHIPS.



GREAT BRITAIN.

BATTLESHIPS.

Dreadnought.

Bellerophon.

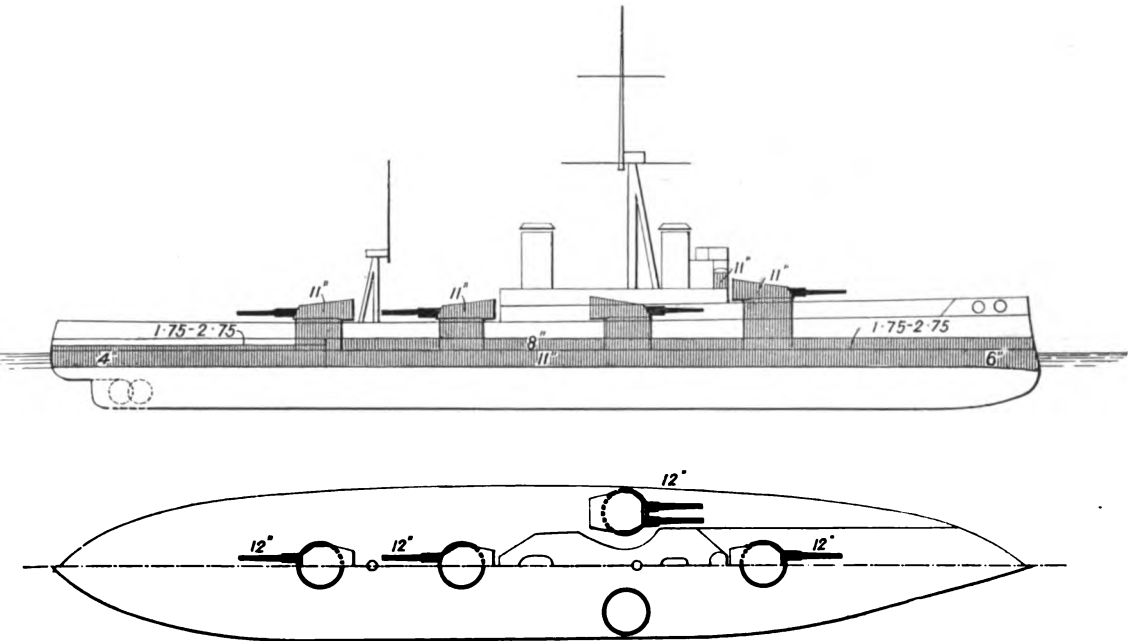
St. Vincent.

Temeraire.

Vanguard.

Superb.

Collingwood.



Dreadnought.—Length, 490 ft. ; 17,900 tons ; Speed, 21·8 knots ; Completed, 1906 ;
Armament, 10—12 in., 27—12 pr.

Bellerophon } —Length, 490 ft. ; 18,600 tons ; Speed, 21·6 knots ; Bellerophon completed February, 1909 ;
Temeraire } Temeraire and Superb completing ;
Superb } Armament, 10—12 in., 16—4 in.

Collingwood } —Length, 500 ft. ; 19,250 tons ; Speed, 21 knots ; Building ;
St. Vincent } Armament, 10—12 in., 20—4 in.
Vanguard }

N.B.—The masts are differently arranged in the later ships.

See page 156.

PLATE 1.

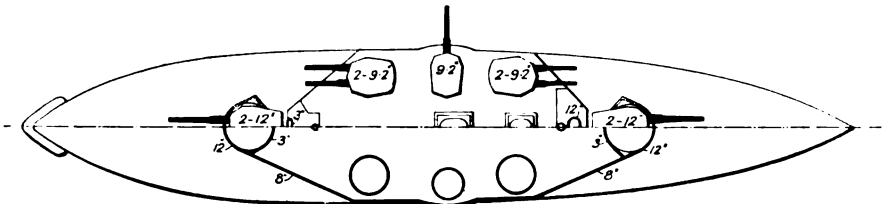
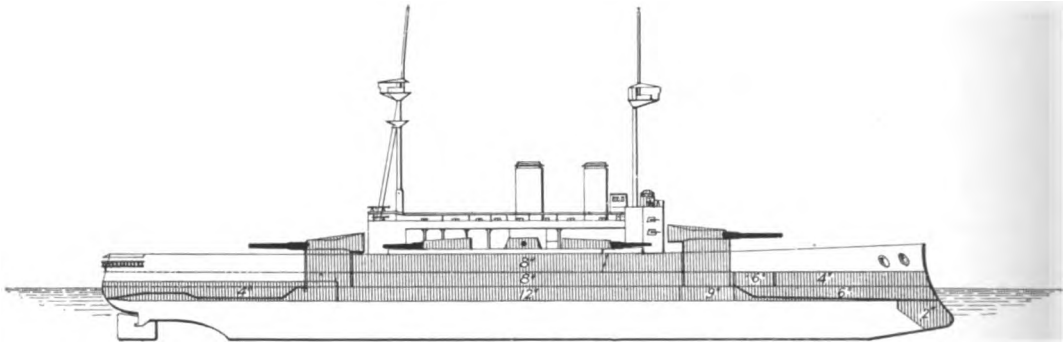
b 2

GREAT BRITAIN.

BATTLESHIPS.

Lord Nelson.

Agamemnon.



Length, 410 ft. ; 16,500 tons ; Speed, 18 knots ; Completed, 1908 ;
Armament, 4—12 in., 10—9·2 in., 24—12 pr., 5—3 pr.

See page 159.

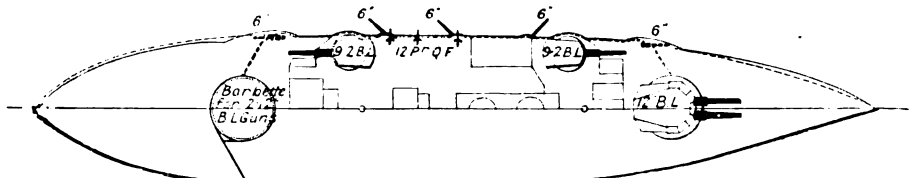
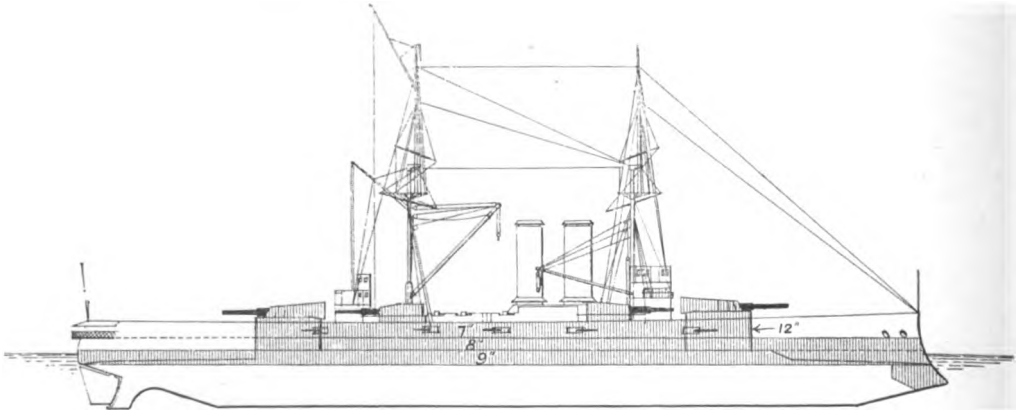
King Edward VII.

Africa.
Hibernia.

Britannia.
Hindustan.

Commonwealth.
New Zealand.

Dominion.



Length, 425 ft. ; 16,350 tons ; Speed, 18·5—19·5 knots ; Completed, 1905—1906 ;
Armament, 4—12 in., 4—9·2 in., 10—6 in., 26 small

See page 158.

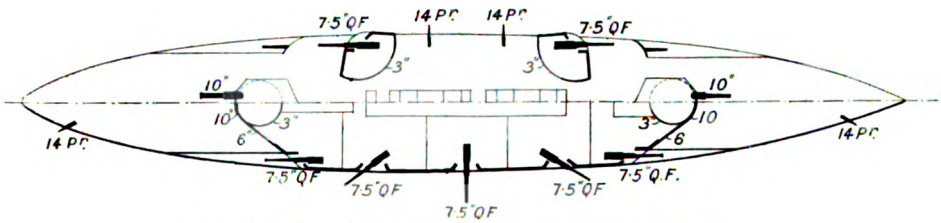
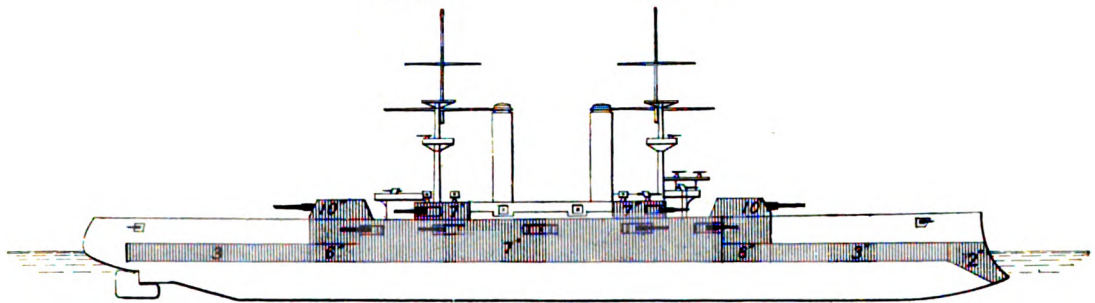
PLATE 2.

GREAT BRITAIN.

BATTLESHIPS.

Triumph.

Swiftsure.



Length, 436 ft. ; 11,860 tons ; Speed, 19·6 knots ; Completed, 1904 ;
Armament, 4—10 in., 14—7·5 in., 14—14 pr., 2—12 pr., 12—6 pr.

See page 161.

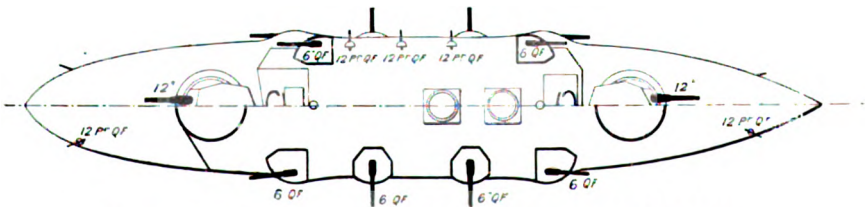
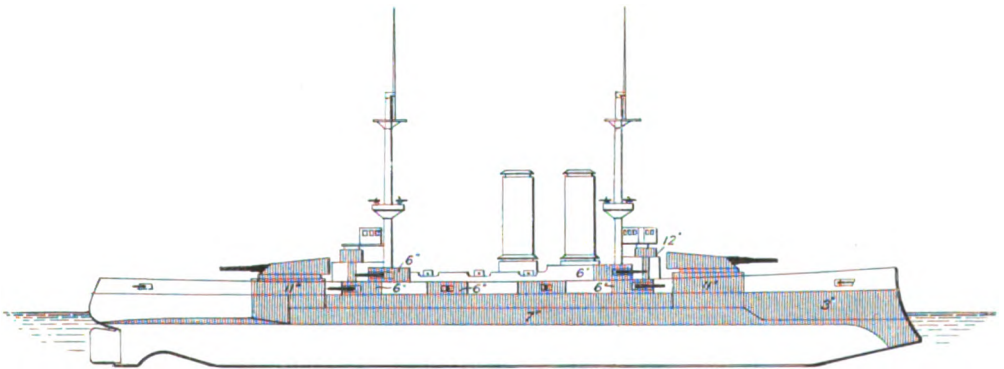
Duncan.

Albemarle.

Cornwallis.

Exmouth.

Russell.



Length, 405 ft. ; 14,000 tons ; Speed, 18·6—19·3 knots ; Completed, 1903—1904 ;
Armament, 4—12 in., 12—6 in., 12—12 pr., 8—3 pr.

See page 156.

PLATE 3.

GREAT BRITAIN.

BATTLESHIPS.

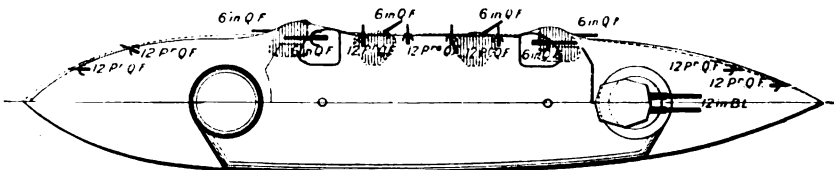
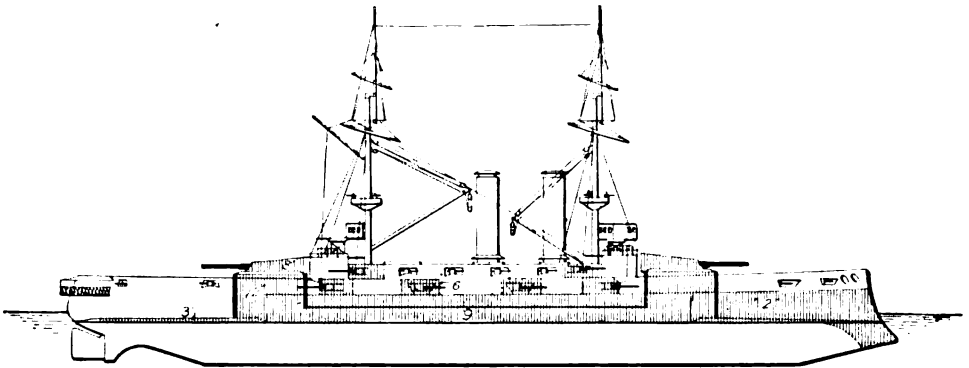
Formidable.

*Bulwark.
*Prince of Wales.

Implacable.
*Queen.

Irresistible.
*Venerable.

*London.



**In These Ships 9" Armour Tapers to 2" at 30 ft From Bow, & They Have no Forward Bulkhead*

Length, 400 ft. ; 15,000 tons ; Speed, 18—18·3 knots ; Completed, 1901-1904 ;
Armament, 4—12 in., 12—6 in., 18—12 pr., 8—3 pr.

See page 157.

Canopus.

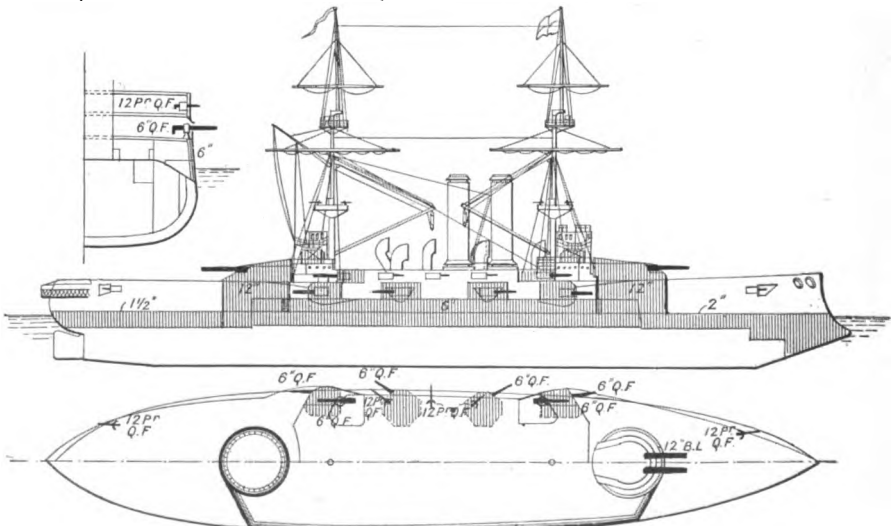
Albion.

Glory.

Goliath.

Ocean.

Vengeance.



Length, 390 ft. ; 12,950 tons ; Speed, 18·2—18·5 knots ; Completed, 1900-1902 ;
Armament, 4—12 in., 12—6 in., 12—12 pr., 8—3 pr.

See page 155.

PLATE 4.

GREAT BRITAIN.

BATTLESHIPS.

Majestic.

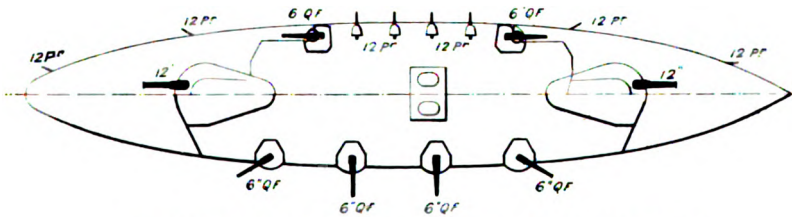
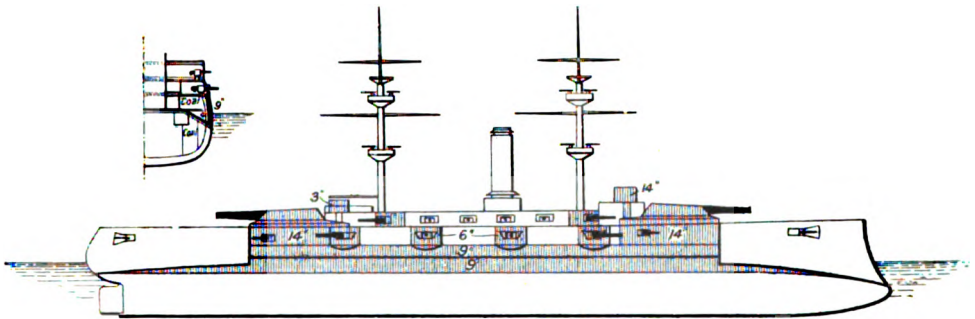
Cæsar.
Mars.

Hannibal.
Prince George.

Illustrious.

Jupiter.
Victorious.

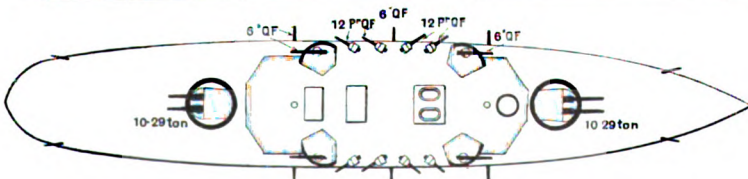
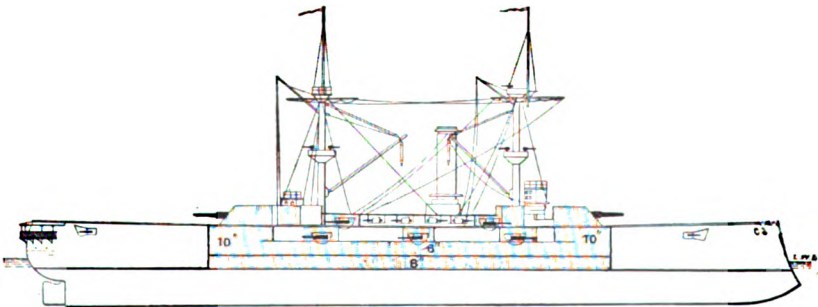
Magnificent.



Length, 380 ft. ; 14,900 tons ; Speed, 17.5 knots ; Completed, 1895-1898 ;
Armament, 4—12 in., 12—6 in., 18—12 pr., 12—3 pr.

See page 159.

Renown.



Length, 380 ft. ; 12,350 tons ; Speed, 18 knots ; Completed, 1896 ;
Armament, 4—10 in., 10—6 in., 14—12 pr., 12—3 pr.

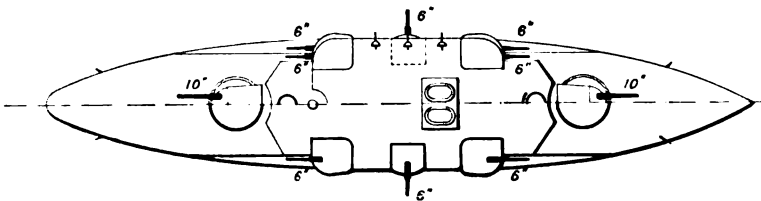
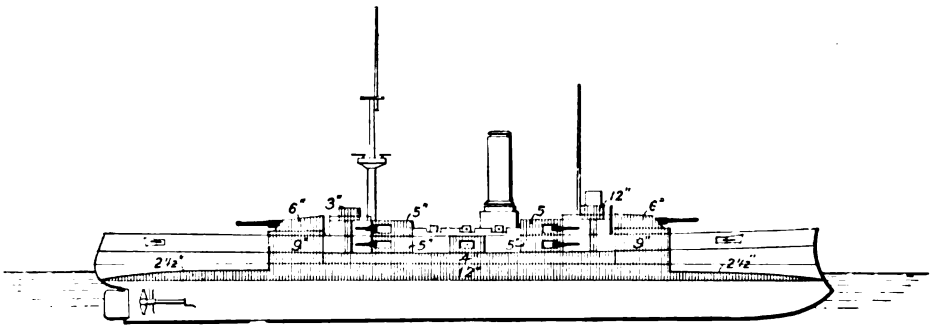
See page 159.

GREAT BRITAIN.

BATTLESHIPS.

Barfleur.

Centurion.



Length, 360 ft. ; 10,500 tons ; Speed, 18.2-18.5 knots ; Completed, 1893-1894 ;
Armament, 4-10 in., 10-6 in., 2-9 pr., 8-6 pr., 9-3 pr.

See page 154.

Royal Sovereign.

Empress of India.

*Hood.

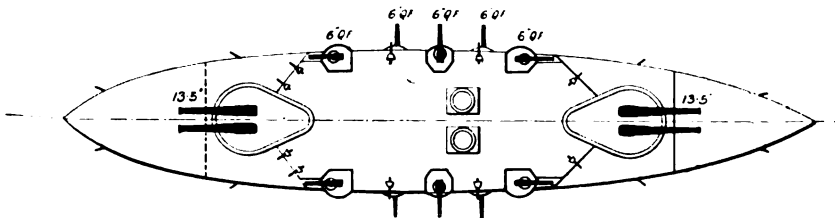
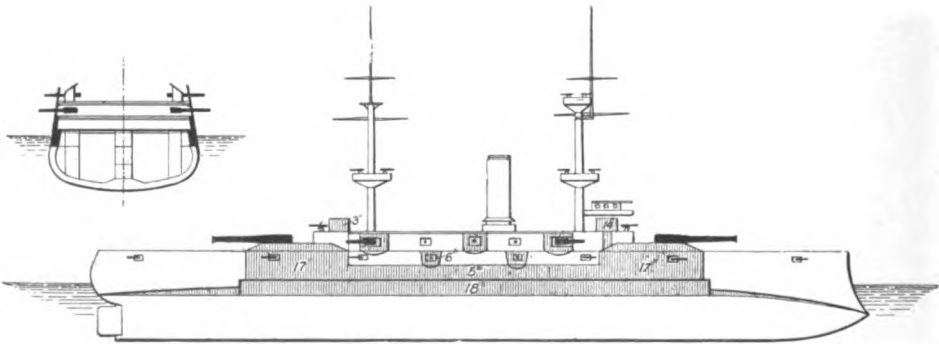
Ramillies.

Repulse.

Resolution.

Revenge.

Royal Oak.



* The 13.5 guns are in turrets on the "Hood"

Length, 380 ft. ; 14,150 tons ; Speed, 17.5-18 knots ; Completed, 1892-1895 ;
Armament, 4-13.5 in., 10-6 in., 16-6 pr., 12-3 pr.

See page 160.

PLATE 6.

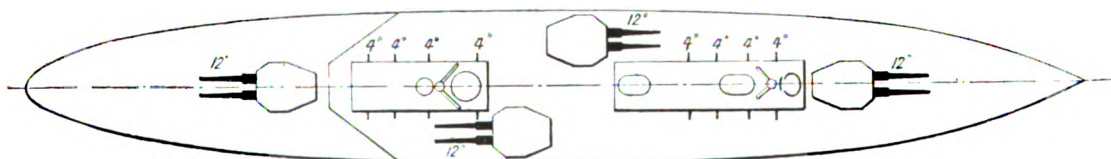
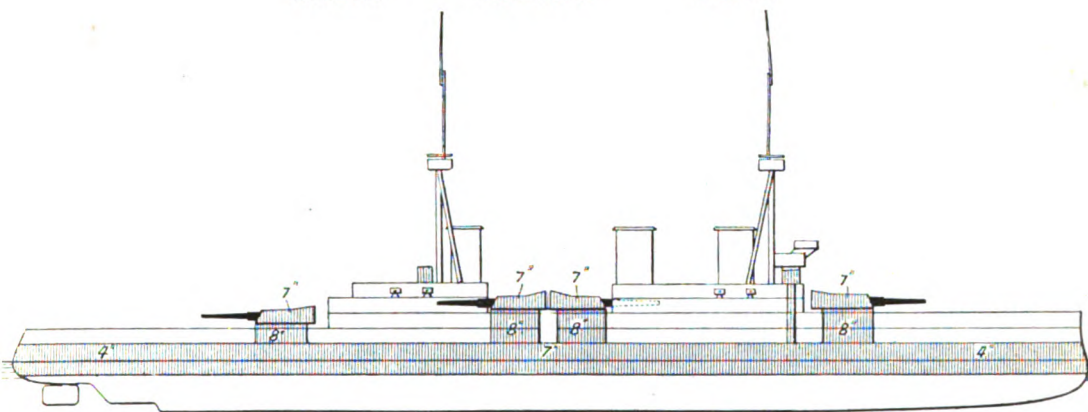
GREAT BRITAIN.

ARMoured CRUISERS.

Invincible.

Indomitable.

Inflexible.



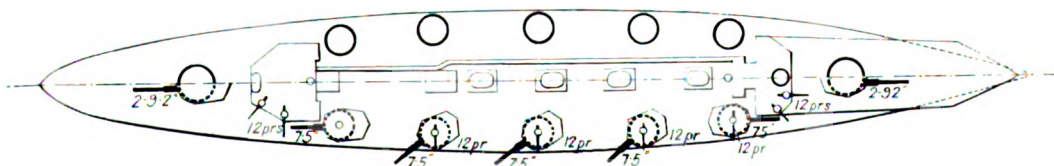
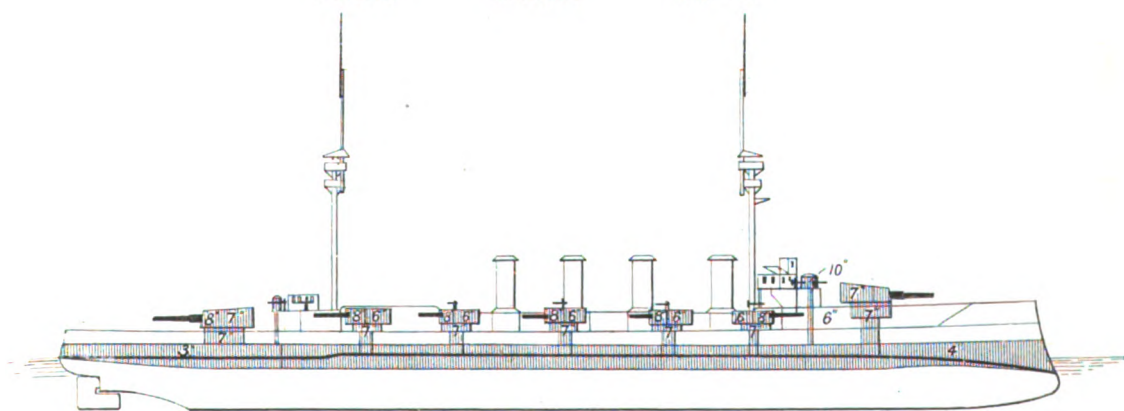
Length, 530 ft. ; 17,250 tons ; Speed, 26 knots ; Completed, 1908-9 ;
Armament, 8—12 in., 16—4 in.

See page 158.

Defence.

Minotaur.

Shannon.



Length, 490 ft. ; 14,600 tons ; Speed, 22.5-23 knots ; Completed, 1907-1908 ;
Armament, 4—9.2 in., 10—7.5 in., 16—12 pr., 30—3 pr.

See page 156.

PLATE 7.

GREAT BRITAIN.

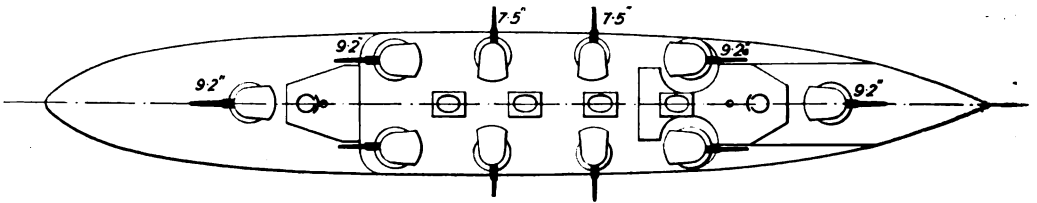
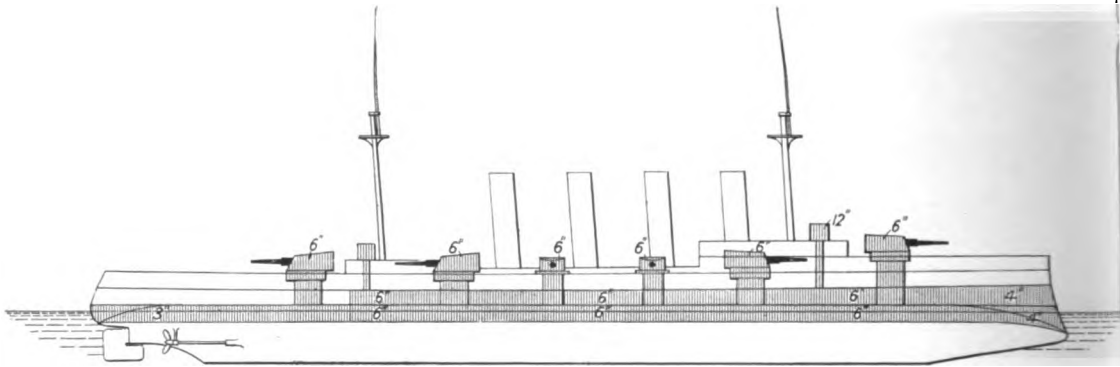
ARMoured CRUISERS.

Achilles.

Cochrane.

Natal.

Warrior.

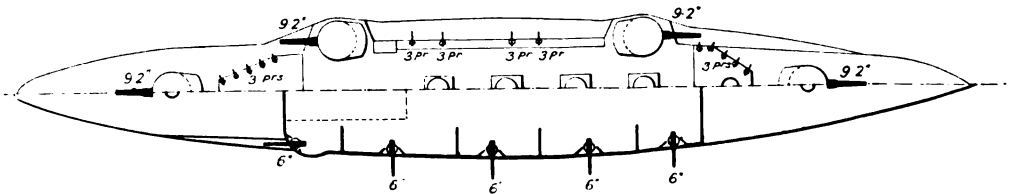
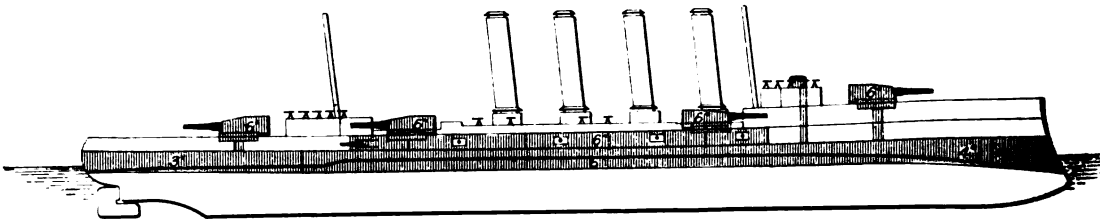


Length, 480 ft. ; 13,550 tons ; Speed, 22.3-23.3 knots ; Completed, 1906-1907 ;
Armament, 6-9.2 in., 4-7.5 in. ; 2-12 pr., 28-3 pr.

See page 154.

Black Prince.

Duke of Edinburgh.



Length, 480 ft. ; 13,550 tons ; Speed, 22.8-23.6 knots ; Completed, 1906 ;
Armament, 6-9.2 in., 10-6 in., 2-12 pr., 28-3 pr.

See page 155.

GREAT BRITAIN.

ARMOURD CRUISERS.

Devonshire.

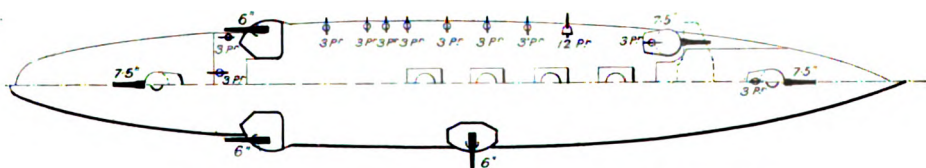
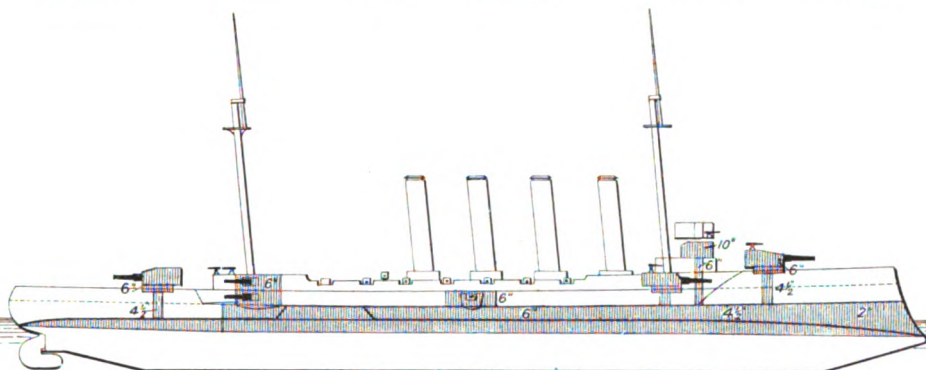
Antrim.

Argyll.

Carnarvon.

Hampshire.

Roxburgh.



Length, 450 ft. ; 10,850 tons ; Speed, 22.2-23.6 knots ; Completed, 1905-1906 ;
Armament, 4-7.5 in., 6-6 in., 2-12 pr., 22-3 pr.

See page 156.

Bedford.

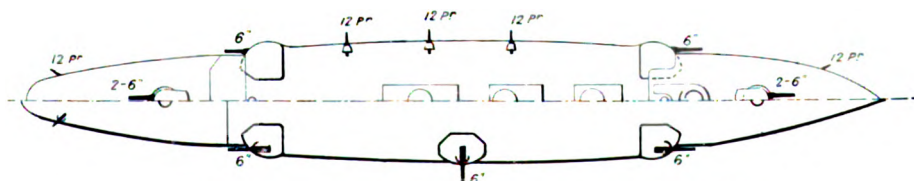
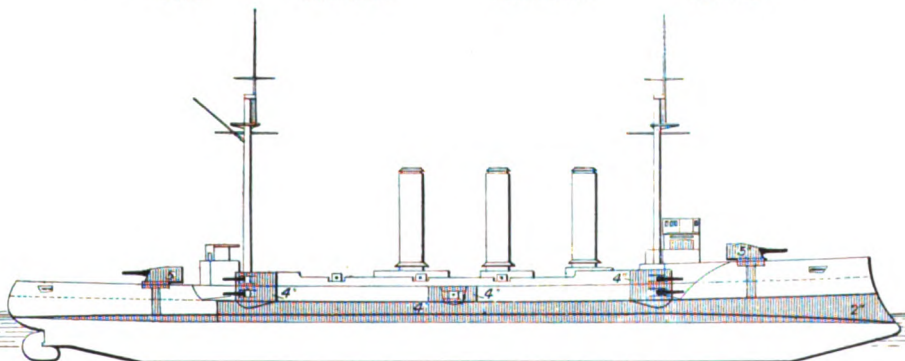
Berwick.
Kent.

Cornwall.
Lancaster.

Cumberland.
Monmouth.

Donegal.
Suffolk.

Essex.



Length, 440 ft. ; 9,300 tons ; Speed, 22.7-24.7 knots ; Completed, 1903-1905 ;
Armament, 14-6 in., 10-12 pr., 3-3 pr.

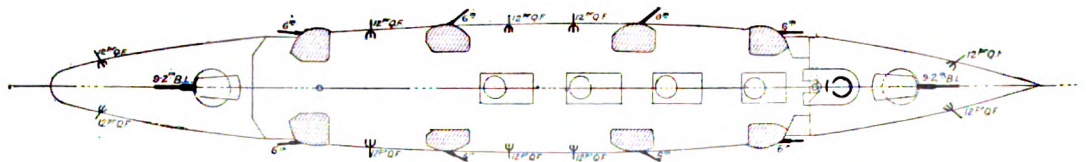
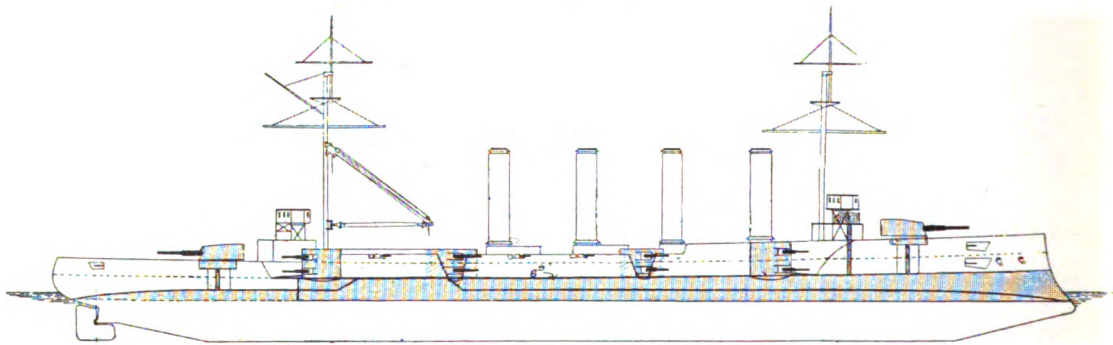
See page 155.

PLATE 9.

GREAT BRITAIN.

ARMoured CRUISERS.

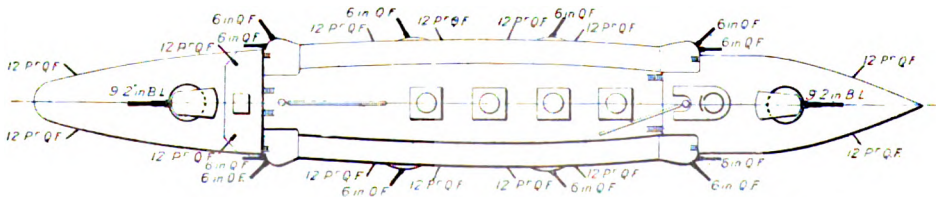
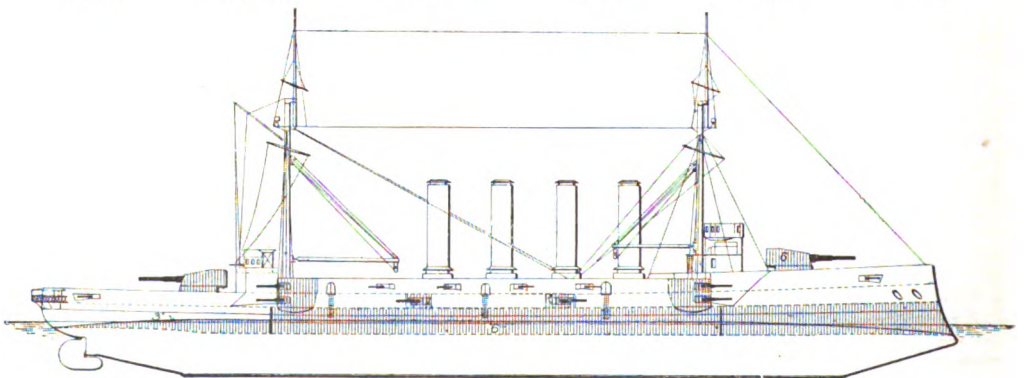
Drake. Good Hope. King Alfred. Leviathan.



Length, 500 ft. ; 14,100 tons ; Speed, 23·3-24·1 knots ; Completed, 1902-1903 ;
Armament, 2-9·2 in., 16-6 in., 14-12 pr., 3-3 pr.

(See page 156.)

Cressy. Aboukir. Bacchante. Euryalus. Hogue. Sutlej.



Length, 440 ft. ; 12,000 tons ; Speed, 20·8-21·8 knots ; Completed, 1901-1904 ;
Armament, 2-9·2 in., 12-6 in., 14-12 pr., 3-3 pr.

See page 156.

GREAT BRITAIN.

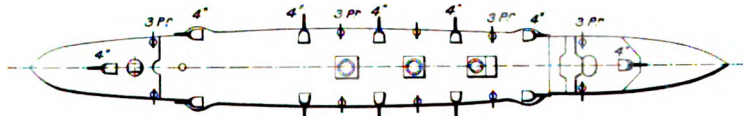
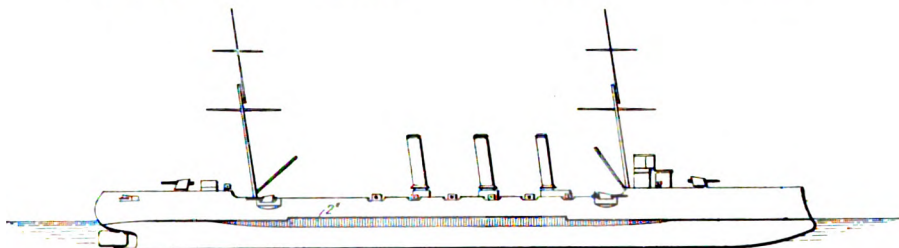
CRUISERS.

Amethyst.

Diamond.

Sapphire.

Topaze.



Length, 360 ft. ; 3000 tons ; Speed, 22·1–23·4 knots ; Completed, 1905 ;
Armament, 12—4 in., 11—3 pr.

See page 162

Amphitrite.

Andromeda.

Argonaut.

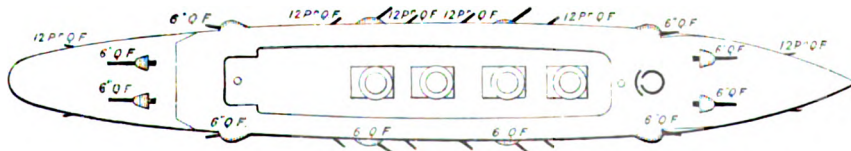
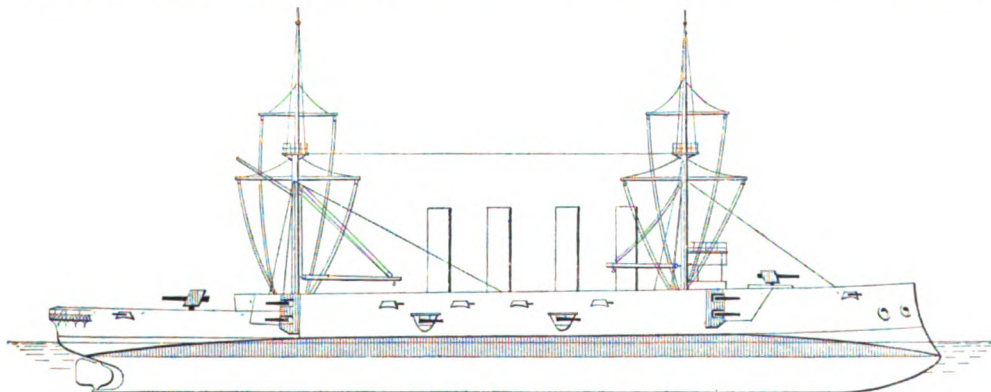
Ariadne.

Diadem.

Europa.

Niobe.

Spartiate.



Length, 435 ft. ; 11,000 tons ; Speed, 20·5–21 knots ; Completed, 1899–1902 ;
Armament, 16—6 in., 14—12 pr., 4—3 pr.

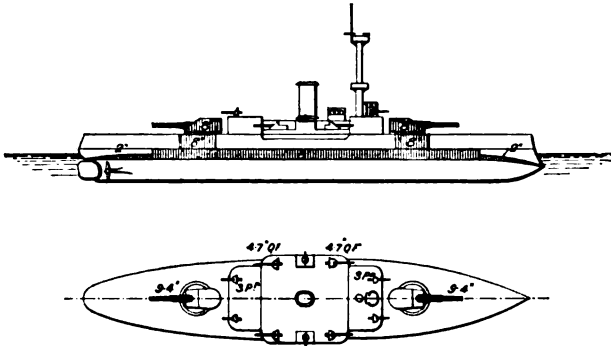
See page 162.

ARGENTINA.

COAST DEFENCE SHIPS.

Independencia.

Libertad.

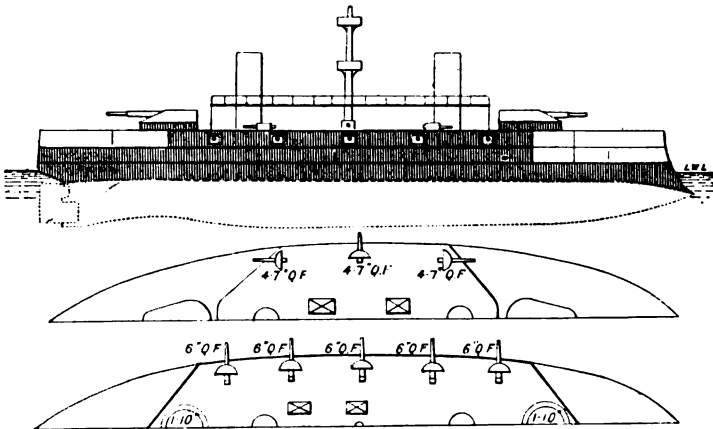


Length, 230 ft. ; 2336 tons ; Speed, 14·4 knots ; Completed, 1892-1893 ;
Armament, 2-9·4 in., 4-4·7 in., 4-3 pr.

See page 170.

Garibaldi.

Pueyrredon.



Length, 328 ft. ; 6732-6773 tons ; Speed, 19·9-20·1 knots ; Completed, 1896-1901 ;
Armament, 2-10 in., 10-6 in., 6-4·7 in., 10-2·2 in., 10-1·4 in.

See page 170.

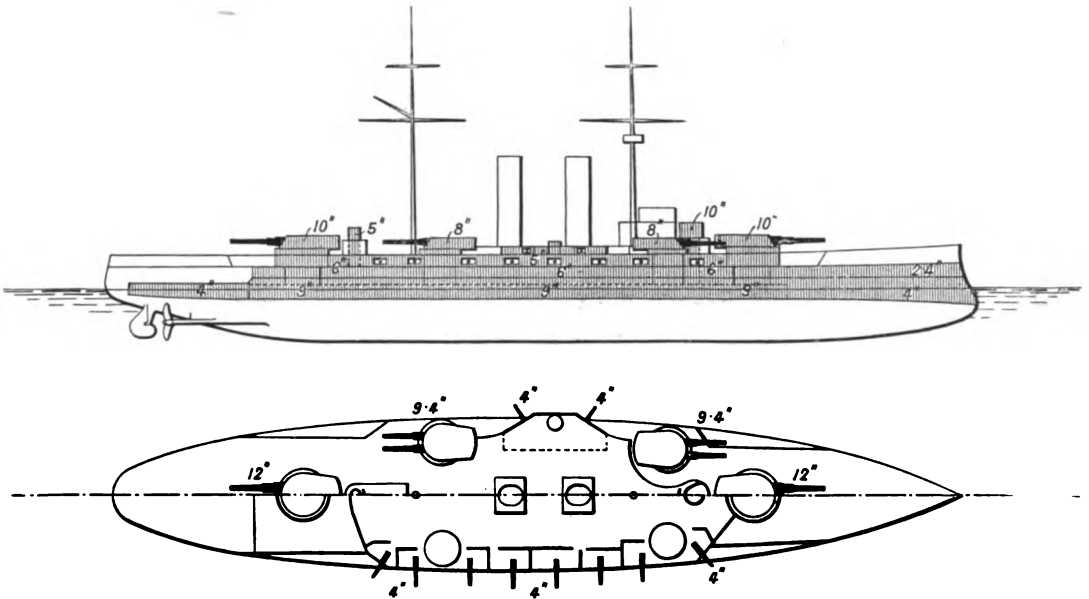
AUSTRIA.

BATTLESHIPS.

Erzherzog Franz Ferdinand.

Radetzky.

Zrinyi.



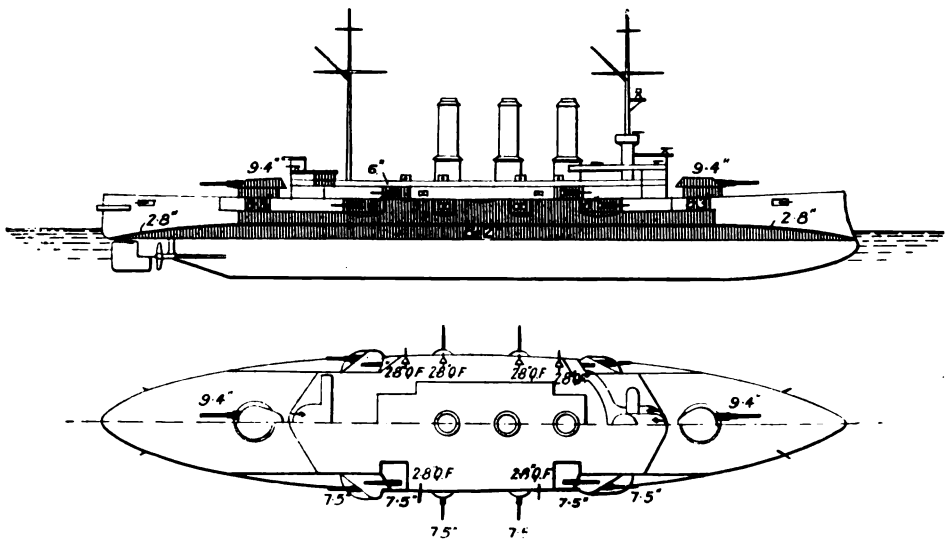
Length, 430 ft. ; 14,500 tons ; Speed, 20 knots ; Building ;
Armament, 4—12 in., 8—9·4 in., 20—4 in.

See page 172.

Erzherzog Ferdinand Max.

Erzherzog Karl.

Erzherzog Friedrich.

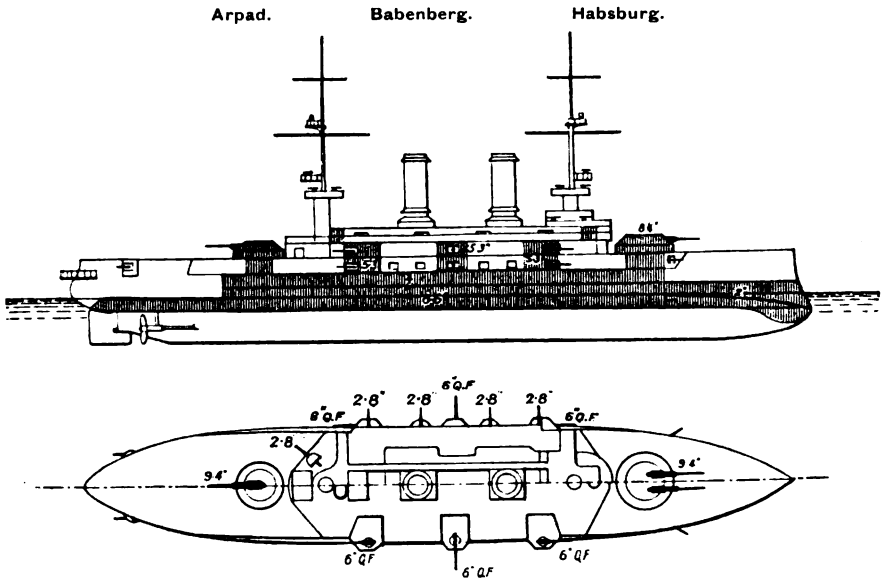


Length, 390 ft. ; 10,433 tons ; Speed, 20—20·6 knots ; Completed, 1906—1907 ;
Armament, 4—9·4 in., 12—7·5 in., 12—2·8 in., 6—1·8 in.

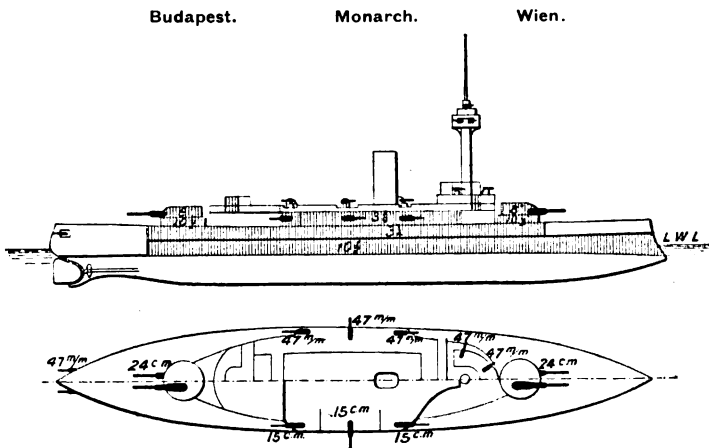
See page 172.

AUSTRIA.

BATTLESHIPS.



See page 172.

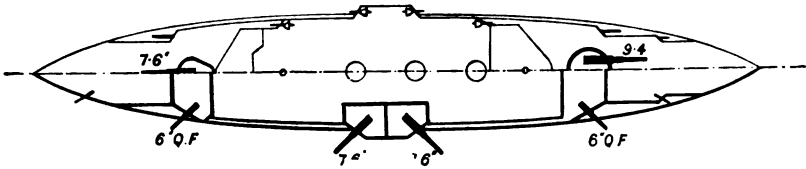
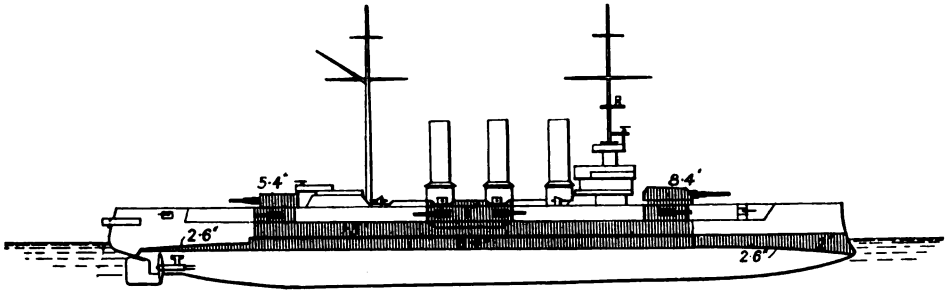


See page 172.

AUSTRIA.

ARMoured CRUISERS.

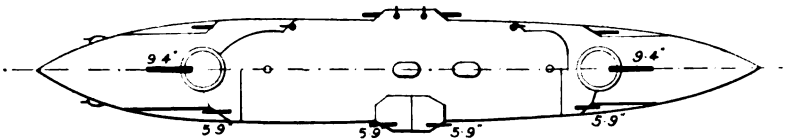
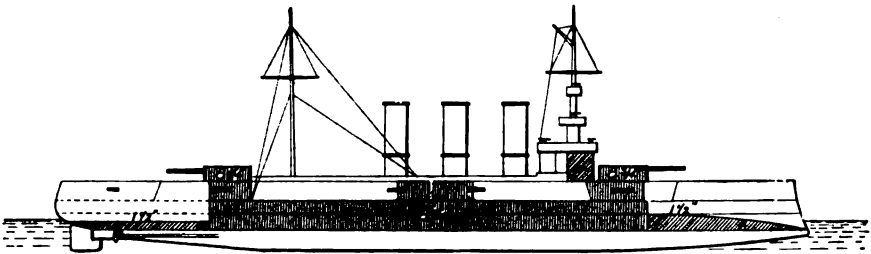
St. Georg.



Length, 334 ft. ; 7185 tons ; Speed, 22 knots ; Completed, 1906 ;
Armament, 2—9·4 in., 5—7·6 in., 4—6 in.

See page 172.

Kaiser Karl VI.



Length, 367 ft. ; 6151 tons ; Speed, 20·7 knots ; Completed, 1900 ;
Armament, 2—9·4 in., 8—5·9 in., 10—1·8 in.

See page 172.

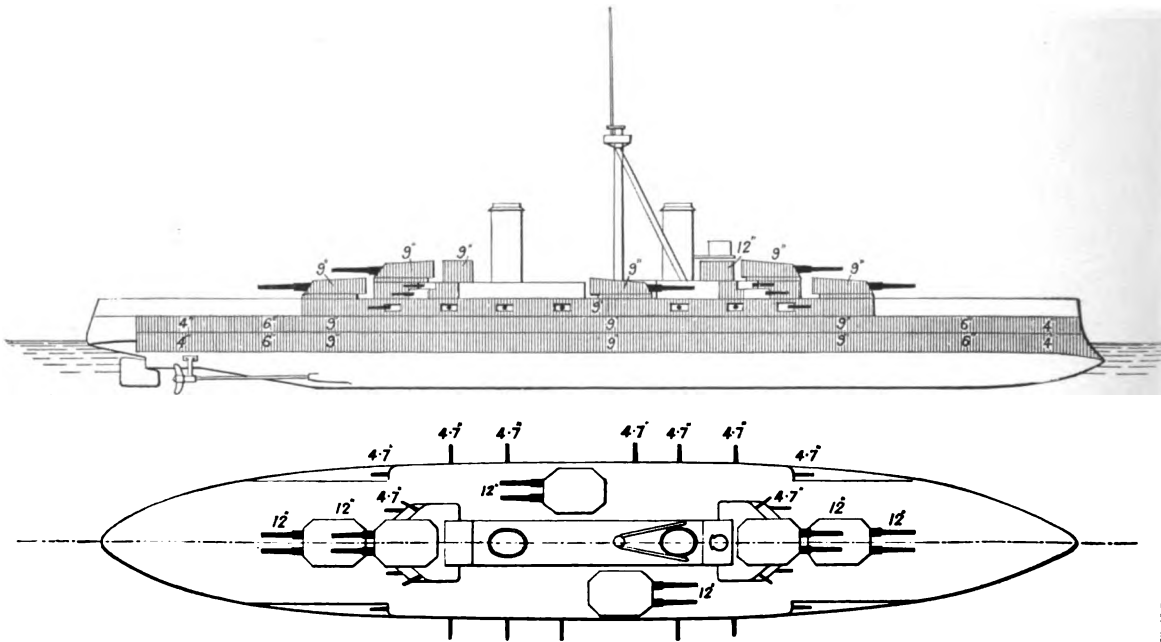
BRAZIL.

BATTLESHIPS.

Minas Geraes.

Rio de Janeiro.

Sao Paulo.



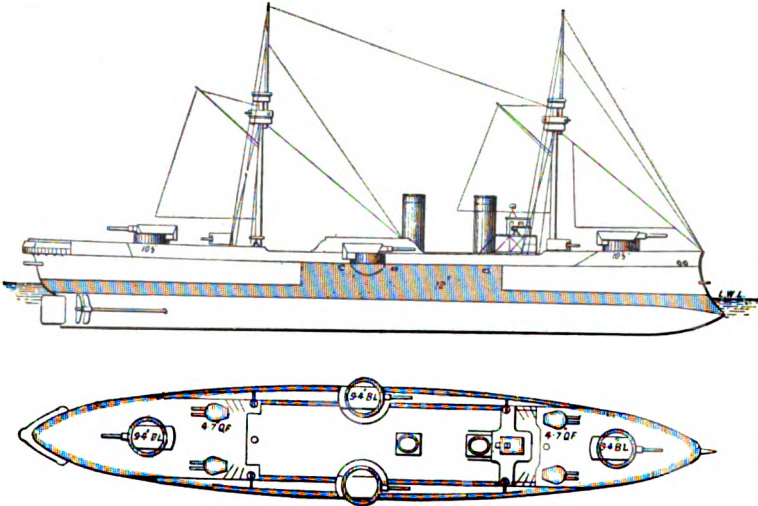
Length, 500 ft. ; 19,500 tons ; Speed, 21 knots ; Building ;
Armament, 12—12 in., 22—4.7 in., 8—6 pr.

See page 174.

CHILI.

BATTLESHIP.

Capitão Prat.

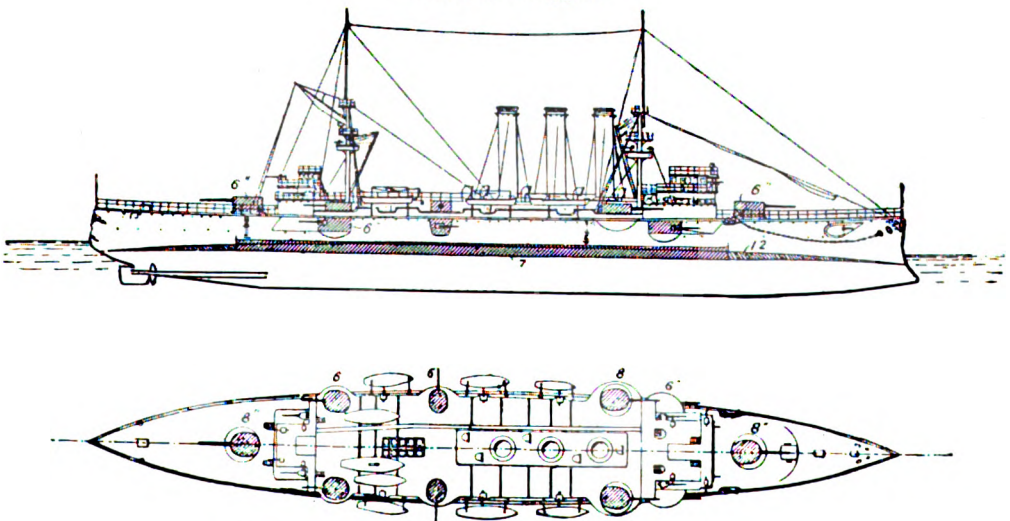


Length, 328 ft. ; 5981 tons ; Speed, 18·3 knots ; Completed, 1893 ;
Armament, 4—9·4 in., 8—4·7 in., 6—2·2 in., 4—1·8 in., 10—1·4 in.

See page 176.

ARMOURED CRUISER.

Almirante O'Higgins.



Length, 412 ft. ; 8590 tons ; Speed, 21·5 knots ; Completed, 1897 ;
Armament, 4—8 in., 10—6 in., 4—4·7 in., 10—12 pr., 10—6 pr.

See page 176.

PLATE 17.

c 2

ARMoured CRUISER.

See page 176.

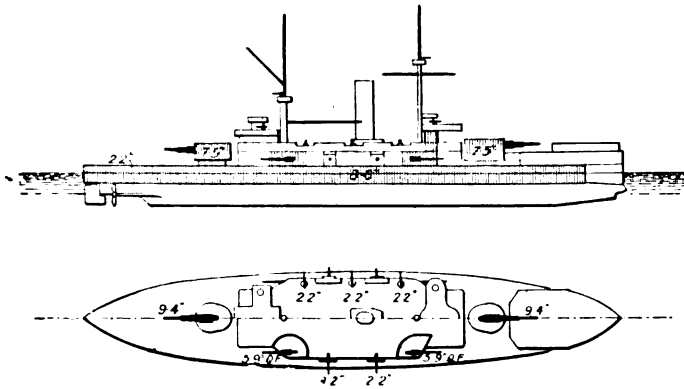
DENMARK.

COAST DEFENCE SHIPS,

Herluf Trolle.

Olfert Fischer.

Peder Skram.



Length, 271 ft. ; 3415 tons ; Speed, 16 knots ; Completed, 1901-1909 ;
Armament, 2—9·4 in., 4—5·9 in., 10 2·2 in.

See page 178.

FRANCE.

BATTLESHIPS.

Condorcet.

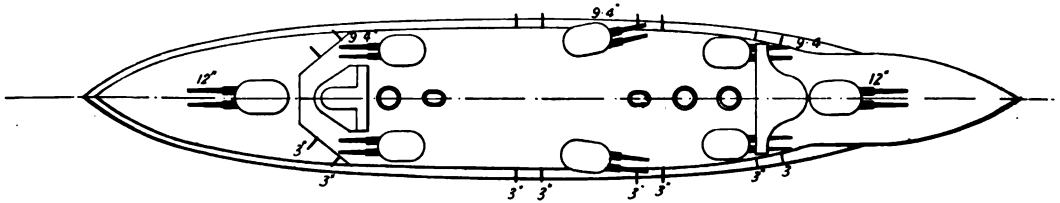
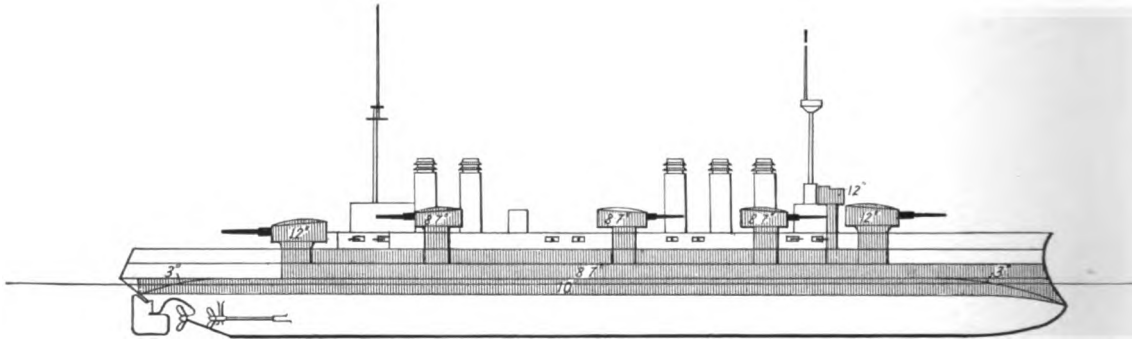
Danton.

Diderot.

Mirabeau.

Vergniaud.

Voltaire.



Length, 476 ft. ; 17,710 tons ; Speed, 19 knots ; Building ;
Armament, 4—12 in., 12—9.4 in., 16—3 in., 8—3 pr., 2—1 pr.

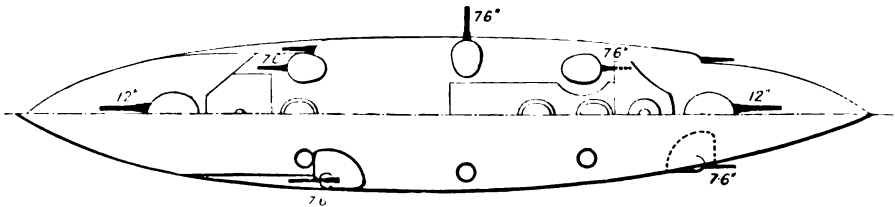
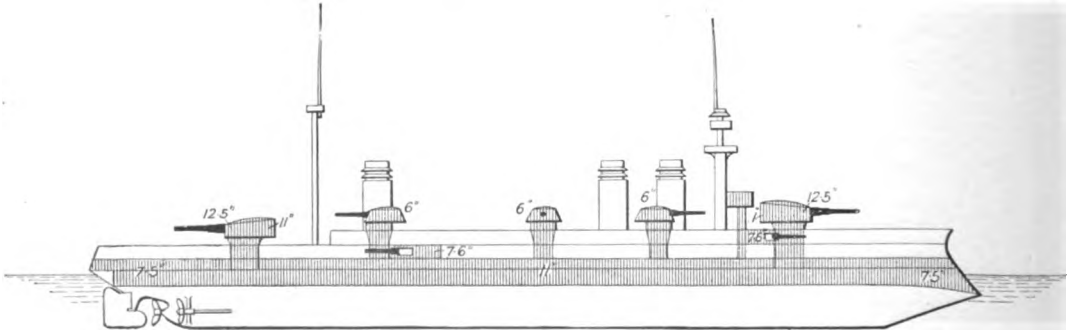
See page 179.

Démocratie.

Justice.

Liberté.

Vérité.



Length, 439 ft. ; 14,635 tons ; Speed, 19.3 knots ; Completed, 1907-1908 ;
Armament, 4—12 in., 10—7.6 in., 26—1.8 in., 2—1.4 in.

See page 179.

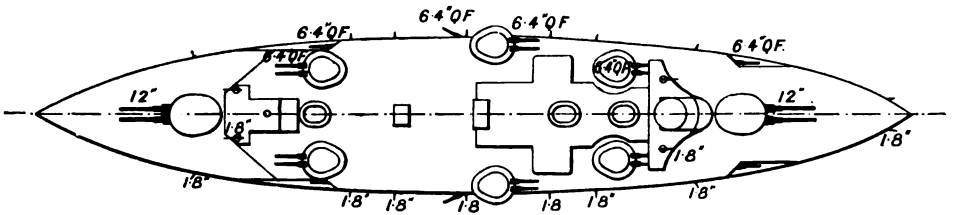
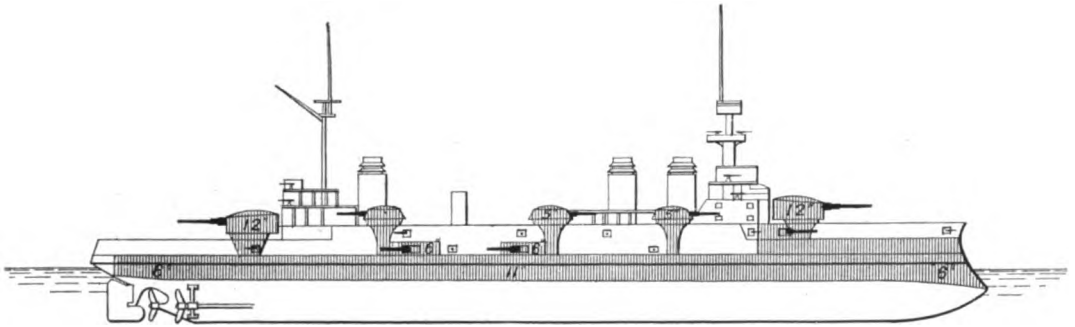
PLATE 20.

FRANCE.

BATTLESHIPS.

Patrie.

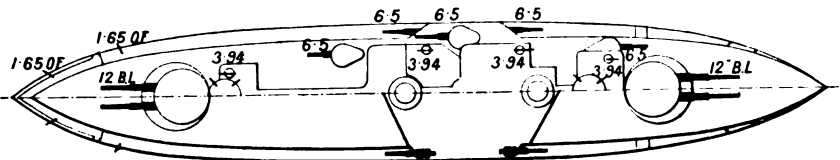
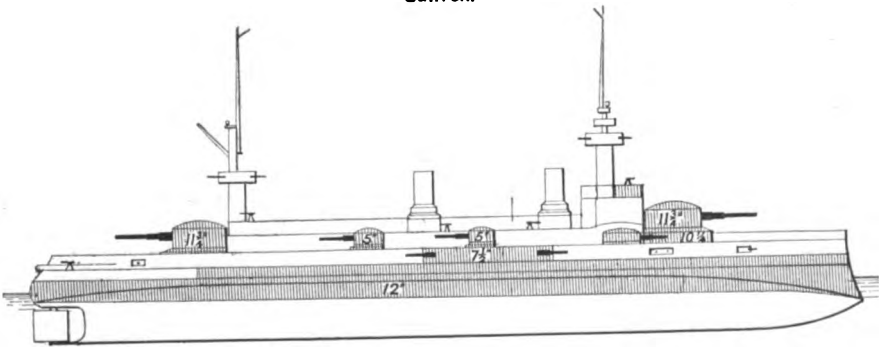
République.



Length, 430 ft. ; 14,635 tons ; Speed, 19·1 knots ; Completed, 1906 ;
Armament, 4—12 in., 18—6·4 in., 20—1·8 in., 2—1·4 in.

See page 181.

Suffren.



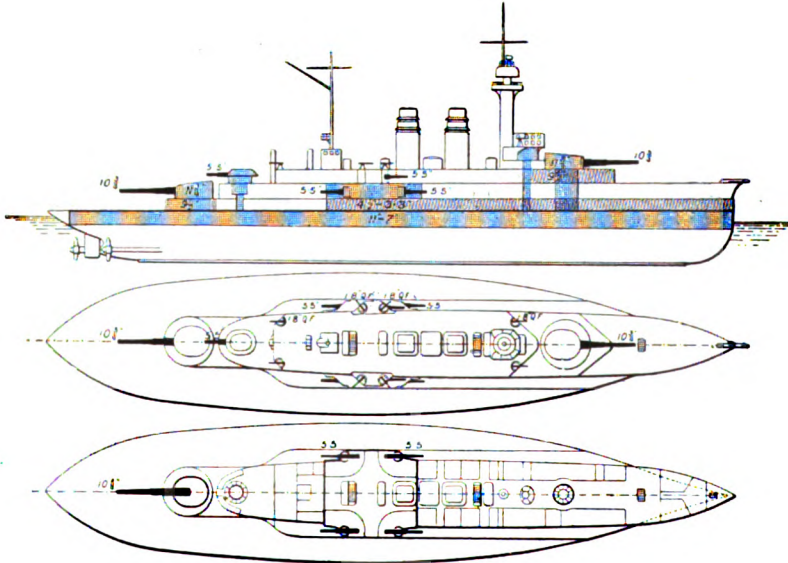
Length, 412 ft. ; 12,527 tons ; Speed, 18 knots ; Completed, 1903 ;
Armament, 4—12 in., 10—6·5 in., 8—3·9 in.

See page 182.

FRANCE.

BATTLESHIPS.

Henri IV.



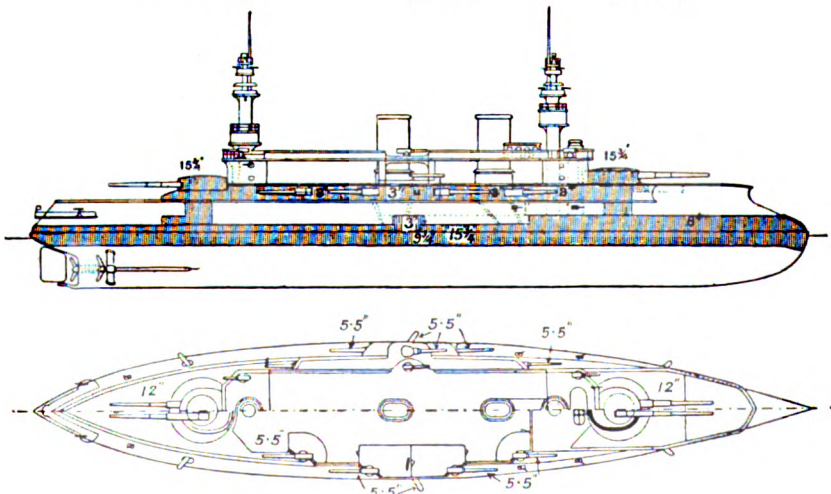
Length, 354 ft. ; 8807 tons ; Speed, 17·2 knots ; Completed, 1903 ;
 ; Armament, 2—10·8 in., 7—5·5 in., 12—1·8 in.

See page 180.

Charlemagne.

Gaulois.

St. Louis.



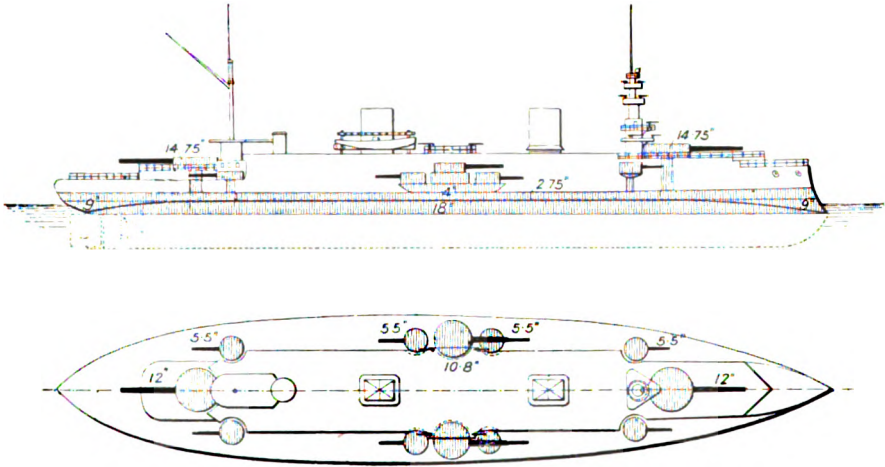
Length, 383 ft. ; 11,108 tons ; Speed, 18 knots ; Completed, 1898-1900 ;
 Armament, 4—12 in., 10—5·5 in., 8—3·2 in., 16—1·8 in., 10—1·4 in.

See page 179.

FRANCE.

BATTLESHIPS.

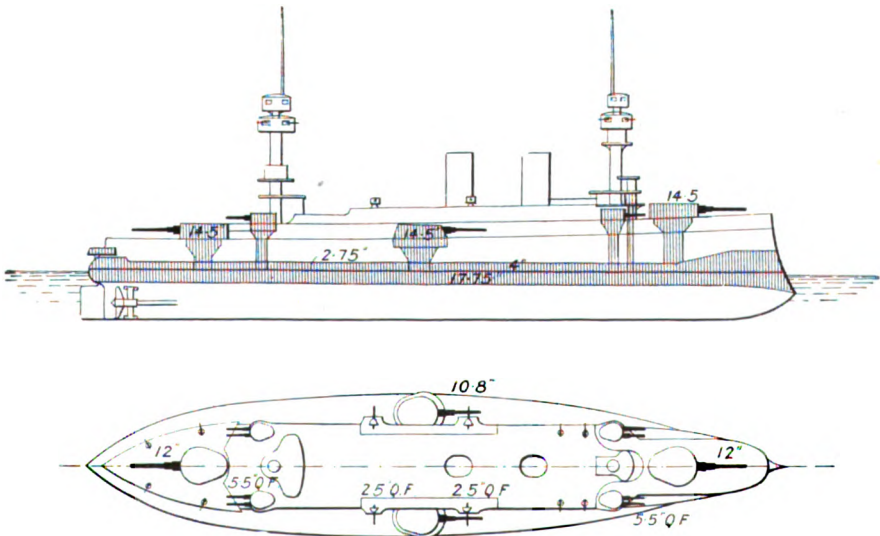
Carnot.



Length, 382 ft. ; 11,954 tons ; Speed, 17.8 knots ; Completed, 1896 ;
Armament, 2—12 in., 2—10.8 in., 8—5.5 in., 4—2.5 in., 16—1.8 in., 10—1.4 in.

See page 179.

Jaureguiberry.

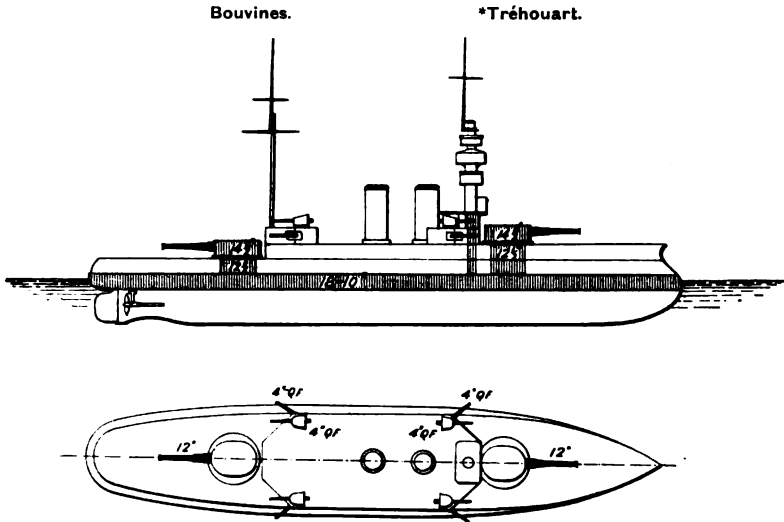


Length, 364 ft. ; 11,637 tons ; Speed, 18 knots ; Completed, 1896 ;
Armament, 2—12 in., 2—10.8 in., 8—5.5 in., 4—2.5 in., 12—1.8 in., 8—1.4 in.

See page 180.

FRANCE.

BATTLESHIPS.

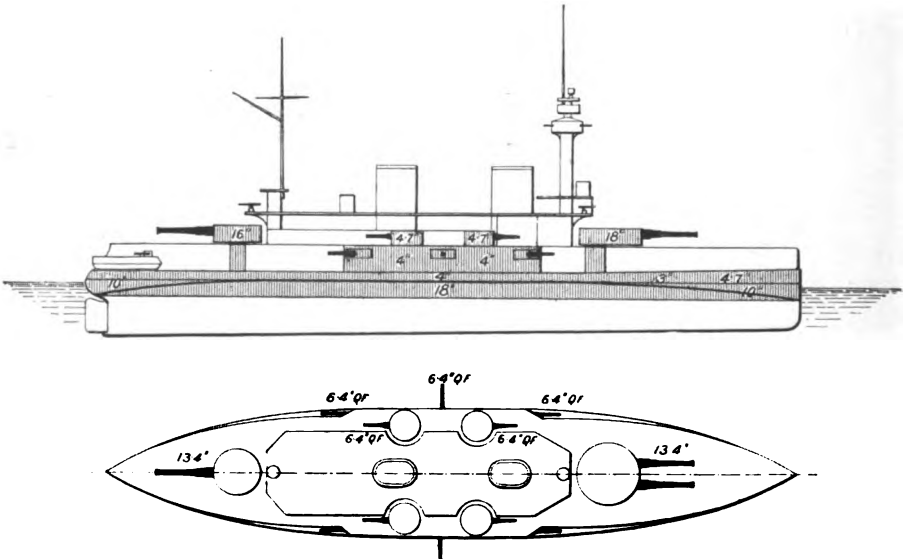


* The "Tréhouart" has but one funnel.

Length, 294 ft. ; 6691 tons ; Speed, 15·7—16 knots ; Completed, 1894—1896 ;
Armament, 2—12 in., 8—4 in., 4—1·8 in., 10—1·4 in.

See page 179.

Brennus.

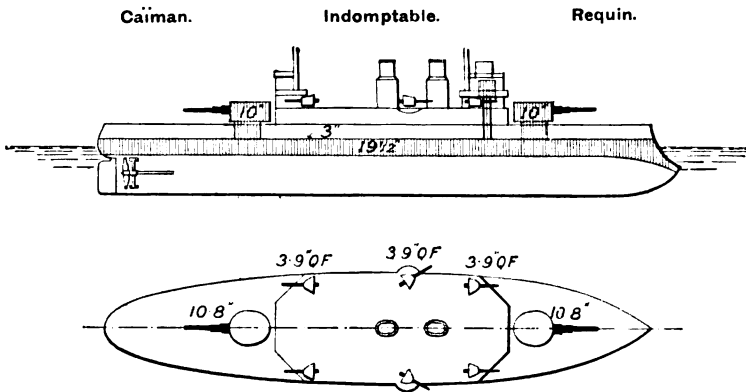


Length, 361 ft. ; 11,190 tons ; Speed, 17·1 knots ; Completed, 1895 ;
Armament, 3—13·4 in., 10—6·4 in.

See page 179.

FRANCE.

BATTLESHIPS.



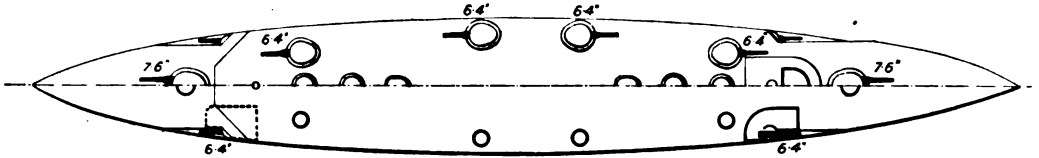
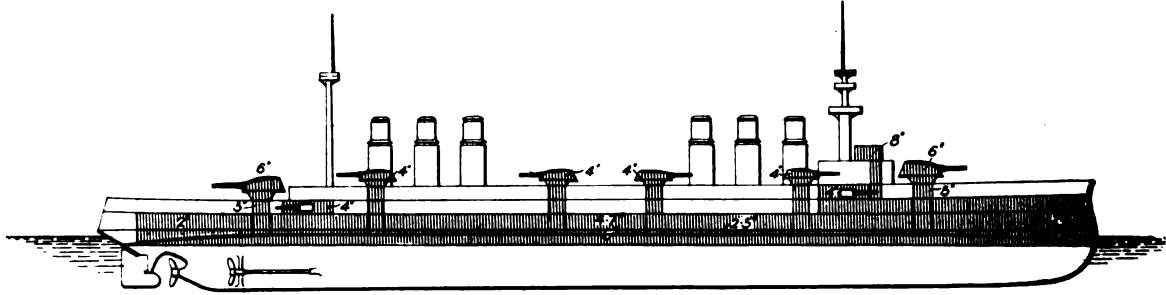
Length, 279 ft. ; 7100 tons ; Speed, 14·5—15 knots ; Completed, 1886-1888 ;
 Armament, 2—10·8 in., 6—3·9 in., 10—1·8 in., 4—1·4 in.

See page 179.

FRANCE.

ARMoured CRUISERS.

Ernest Renan.



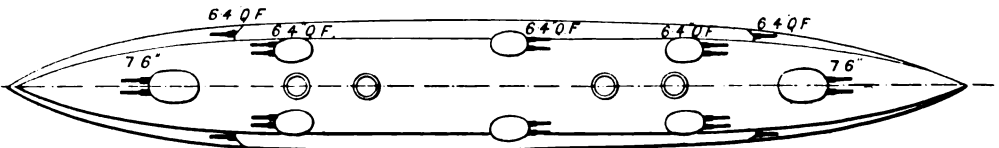
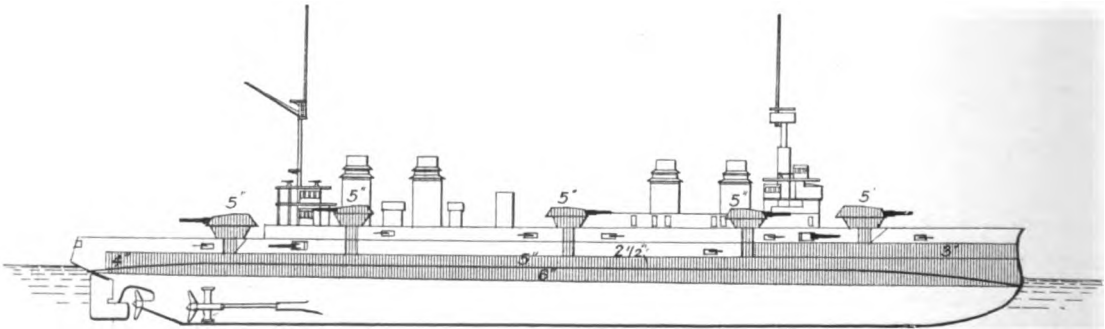
Length, 515 ft. ; 13,427 tons ; Speed, 23.5 knots ; Completed, 1909 ;
Armament, 4—7.6 in., 16—6.4 in., 16—9 pr., 8—3 pr.

See page 180.

Jules Ferry.

Léon Gambetta.

Victor Hugo.

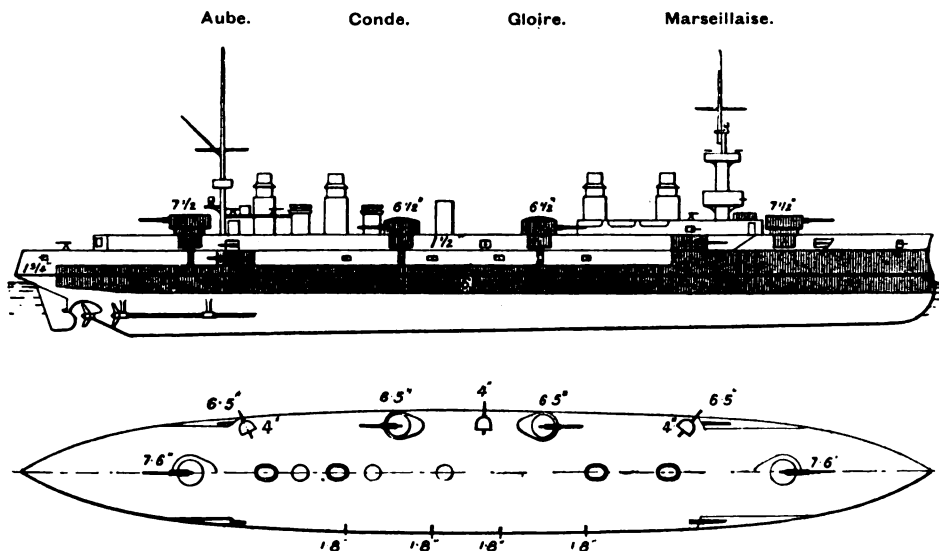


Length, 489 ft. ; 12,351 tons ; Speed, 22.5-23 knots ; Completed, 1904-1906 ;
Armament, 4—7.6 in., 16—6.4 in., 22—1.8 in., 2—1.4 in.

See page 181.

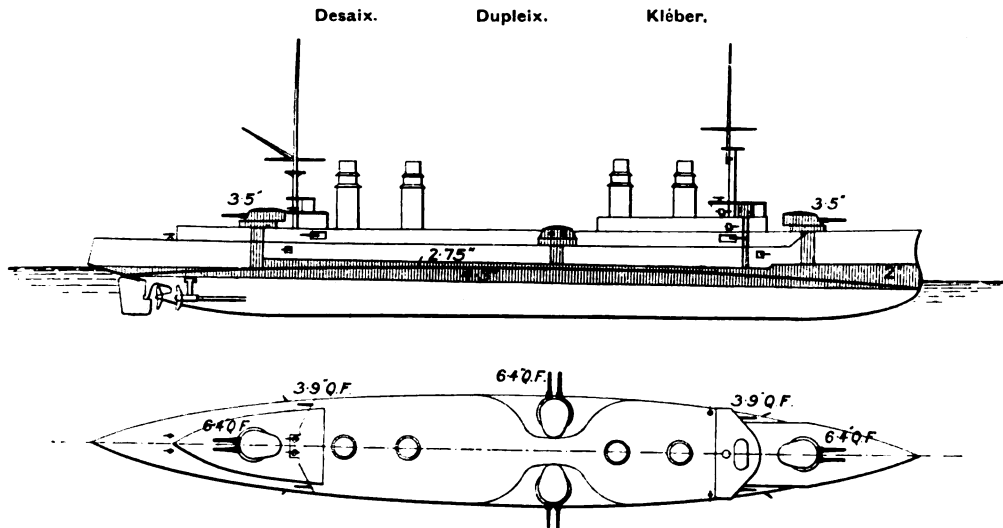
FRANCE.

ARMoured CRUISERS.



Length, 453 ft. ; 9856 tons ; Speed, 21-21.9 knots ; Completed, 1903-1904 ;
Armament, 2-7.6 in., 8-6.5 in., 6-4 in.

See page 179.



Length, 423 ft. ; 7578 tons ; Speed, 21-21.7 knots ; Completed, 1903 ;
Armament, 8-6.4 in., 4-3.9 in., 10-1.8 in., 4-1.4 in.

See page 180.

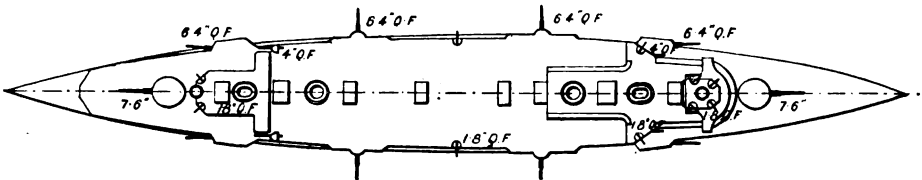
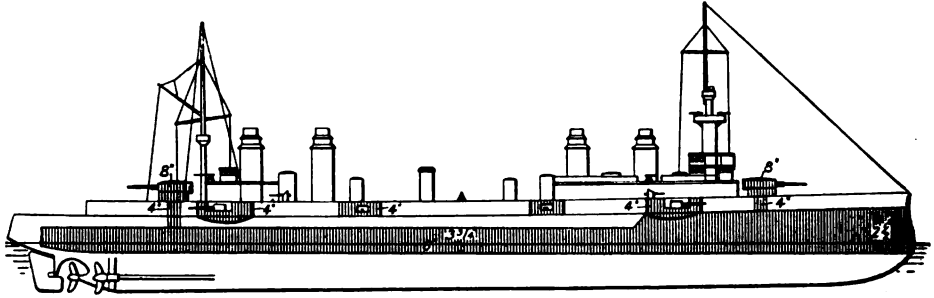
FRANCE.

ARMoured CRUISERS.

Dupetit-Thouars.

Gueydon.

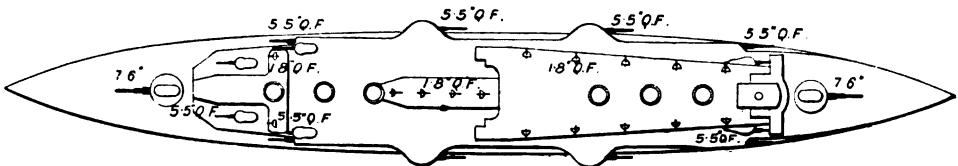
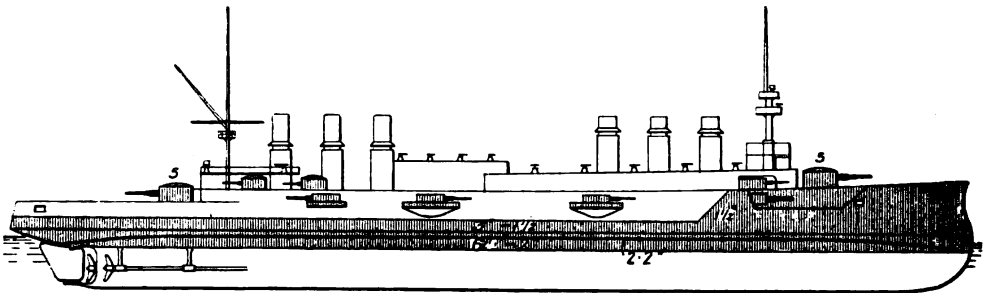
Montcalm.



Length, 453 ft. ; 9367 tons ; Speed, 21-22.5 knots ; Completed, 1902-1905 ;
Armament, 2-7.6 in., 8-6.4 in., 4-4 in., 16-1.8 in., 6-1.4 in.

See page 180.

Jeanne d'Arc.



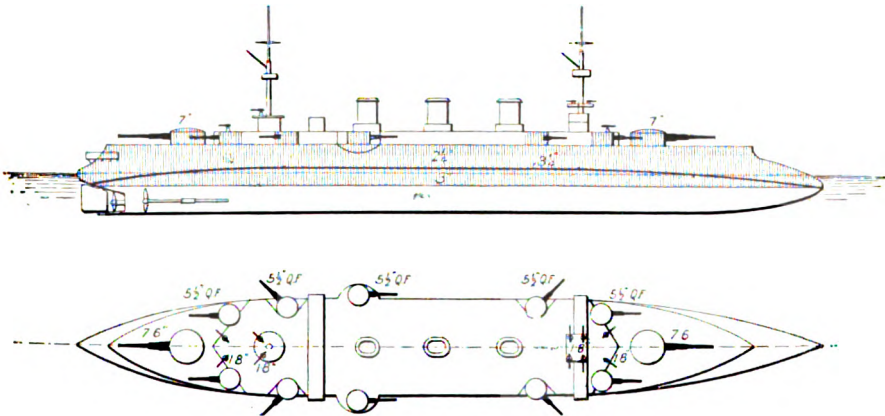
Length, 477 ft. ; 11,092 tons ; Speed, 21.7 knots ; Completed, 1903 ;
Armament, 2-7.6 in., 14-5.5 in., 16-1.8 in., 8-1.4 in.

See page 180.

FRANCE.

ARMoured CRUISER.

Pothuau.

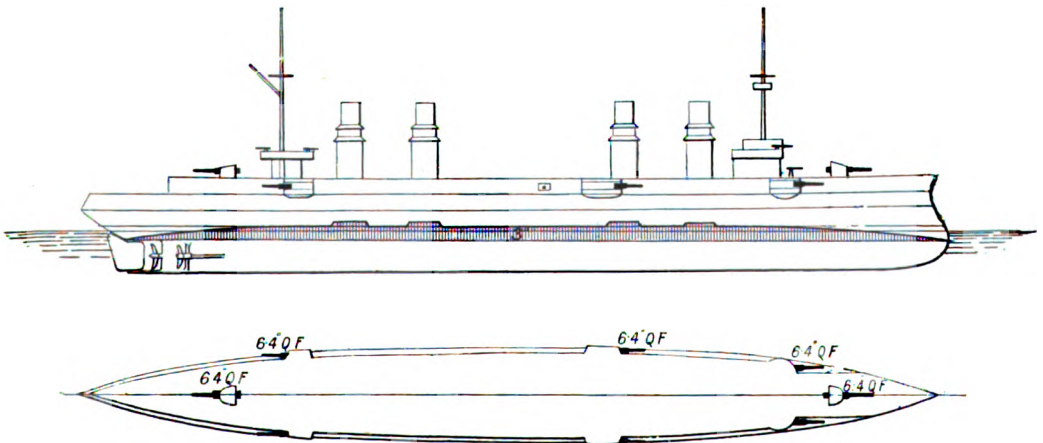


Length, 370 ft. ; 5374 tons ; Speed, 19.2 knots ; Completed, 1896 ;
Armament, 2—7.6 in., 10—5.5 in., 16—1.8 in., 8—1.4 in.

See page 181.

CRUISER.

Jurien de la Gravière.



Length, 440 ft. ; 5595 tons ; Speed, 22.9 knots ; Completed, 1901 ;
Armament, 8—6.4 in., 12—1.8 in.

See page 185.

GERMANY.

BATTLESHIPS.

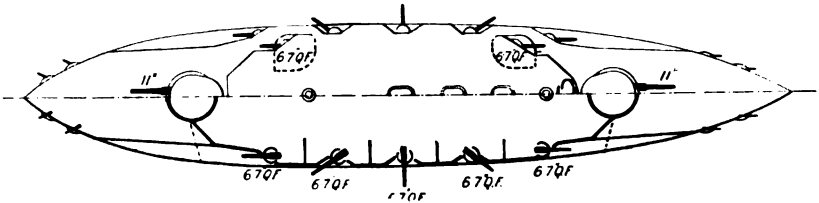
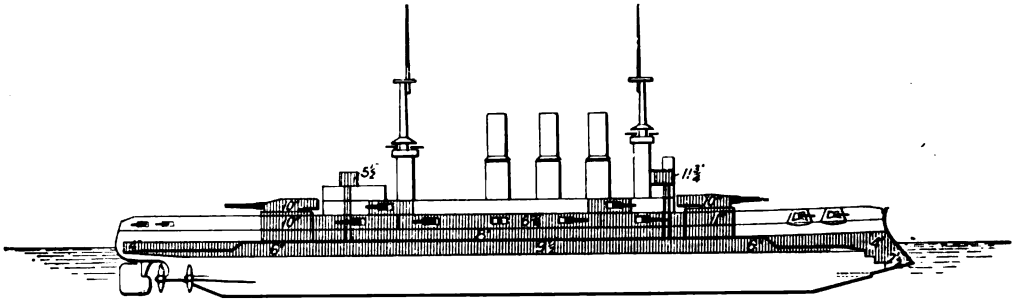
Deutschland.

Hannover.

Pommern.

Schlesien.

Schleswig Holstein.



Length, 398 ft. ; 13,040 tons ; Speed, 18.5—19.2 knots ; Completed, 1906-1909 ;
Armament, 4—11 in., 14—6.7 in., 22—3.4 in., 4—1.4 in.

See page 187.

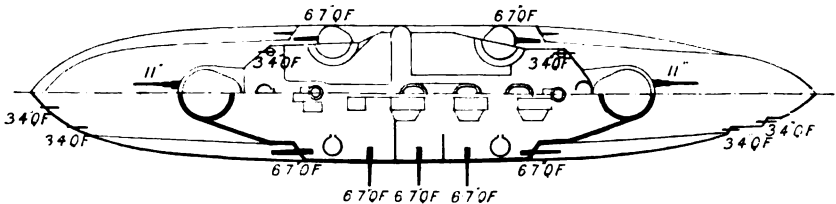
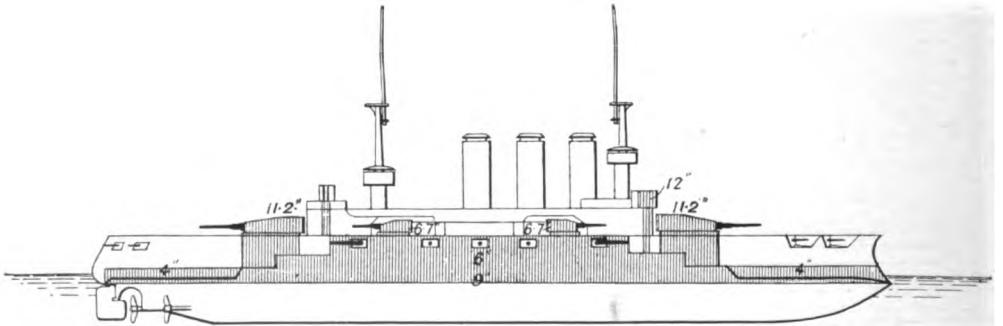
Braunschweig.

Elsass.

Hessen.

Lothringen.

Preussen.



Length, 398 ft. ; 12,997 tons ; Speed, 18—18.7 knots ; Completed, 1904-1906 ;
Armament, 4—11 in., 14—6.7 in., 12—3.4 in., 12—1.4 in.

See page 187.

PLATE 30.

GERMANY.

BATTLESHIPS.

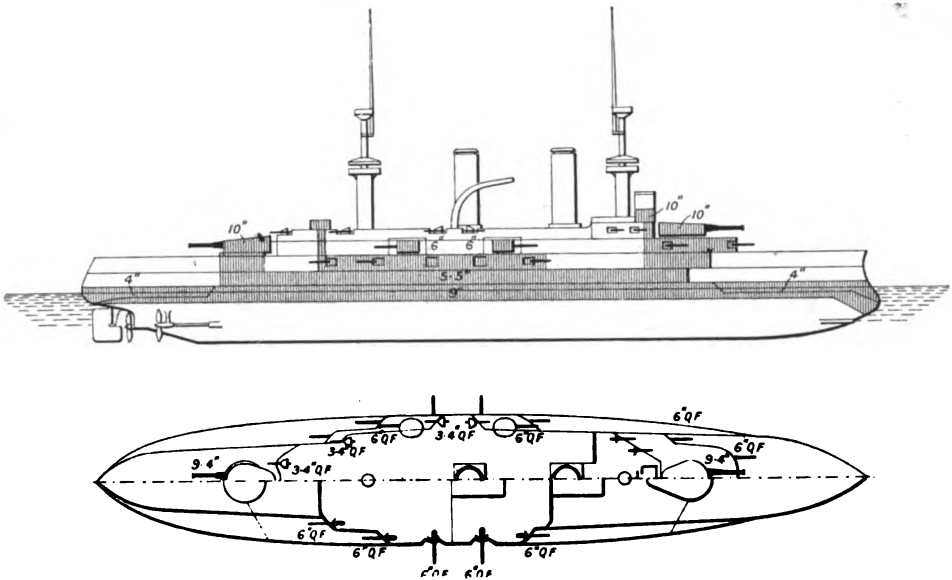
Mecklenburg.

Schwaben.

Wettin.

Wittelsbach.

Zähringen.



Length, 394 ft. ; 11,643 tons ; Speed, 18—19 knots ; Completed, 1902—1903 ;
Armament, 4—9.4 in., 18—6 in., 12—3.4 in., 12—1.4 in.

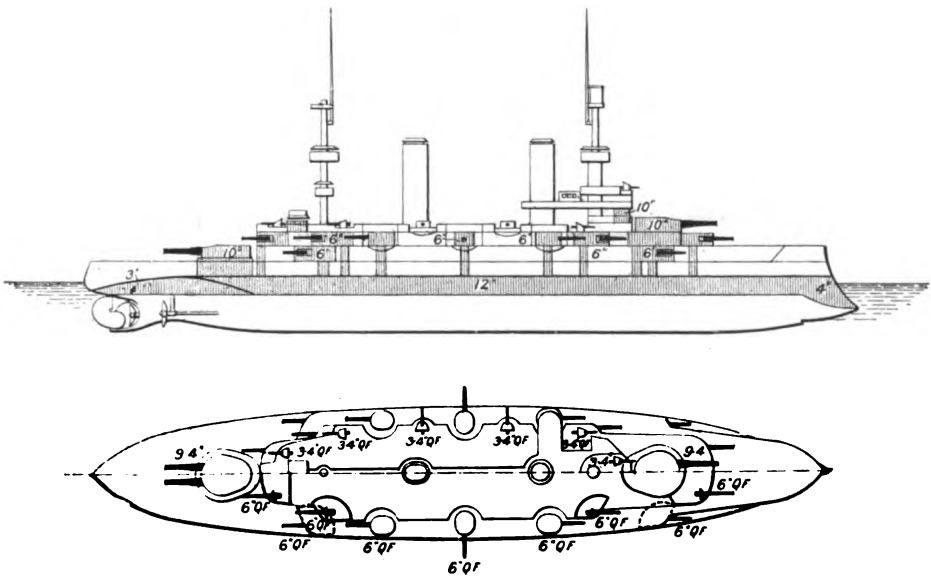
See page 188.

Kaiser Friedrich III.

Kaiser Karl der Grosse.

Kaiser Wilhelm II.

Kaiser Wilhelm der Grosse.



Length, 377 ft. ; 10,974 tons ; Speed, 18 knots ; Completed, 1898—1901 ;
Armament, 4—9.4 in., 18—6 in., 12—3.4 in., 12—1.4 in.

NOTE.—Superstructure is being cut down.

See page 188.

PLATE 31.

d

GERMANY.

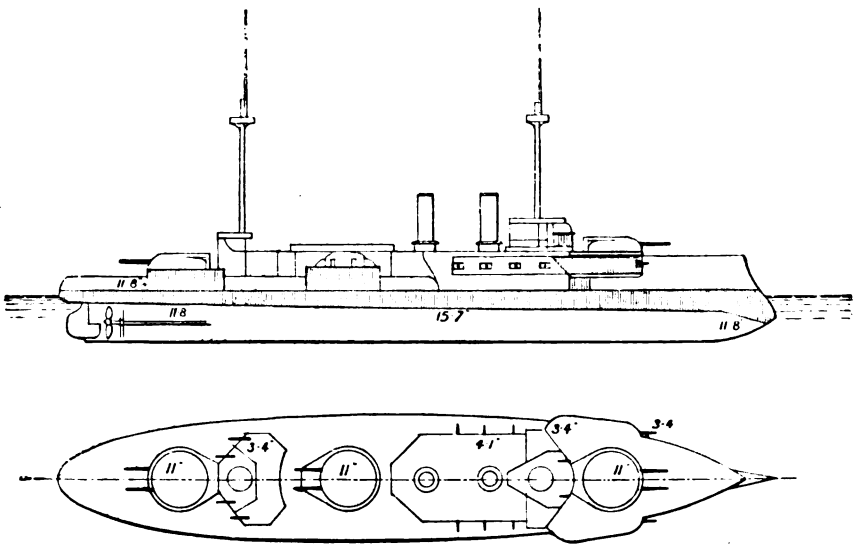
BATTLESHIPS.

Brandenburg.

Kurfürst Friedrich Wilhelm.

Weissenburg.

Wörth.

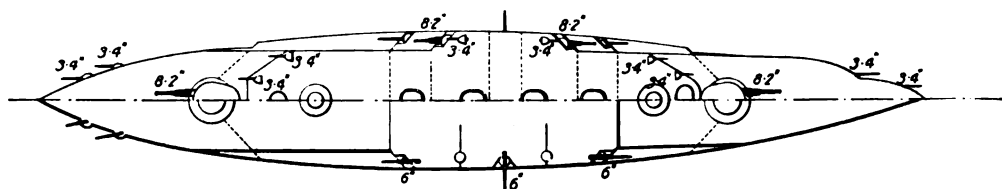


Length, 354 ft. ; 9874 tons ; Speed, 16—17·2 knots ; Completed, 1893-1894 ;
Armament, 6—11 in., 8—4·1 in., 8—3·4 in., 12—1·4 in.

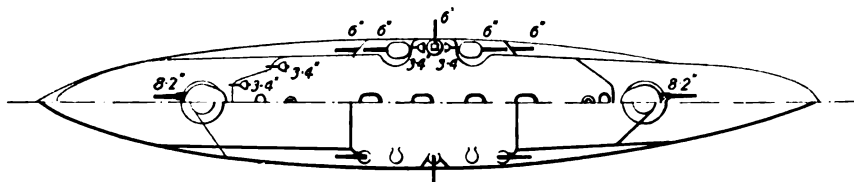
See page 187.

PLATE 32,

ARMoured CRUISERS.



See page 187.



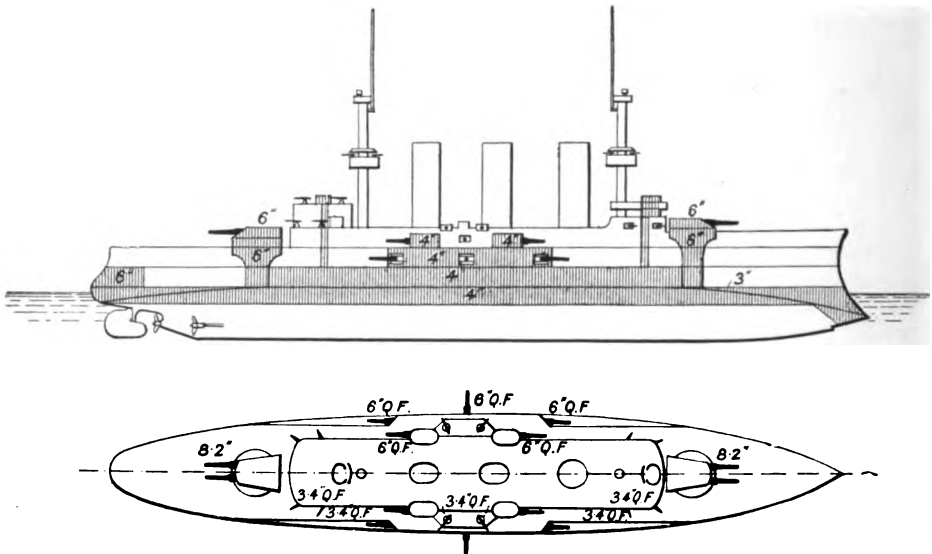
See page 189.

GERMANY.

ARMoured CRUISERS.

Prinz Adalbert.

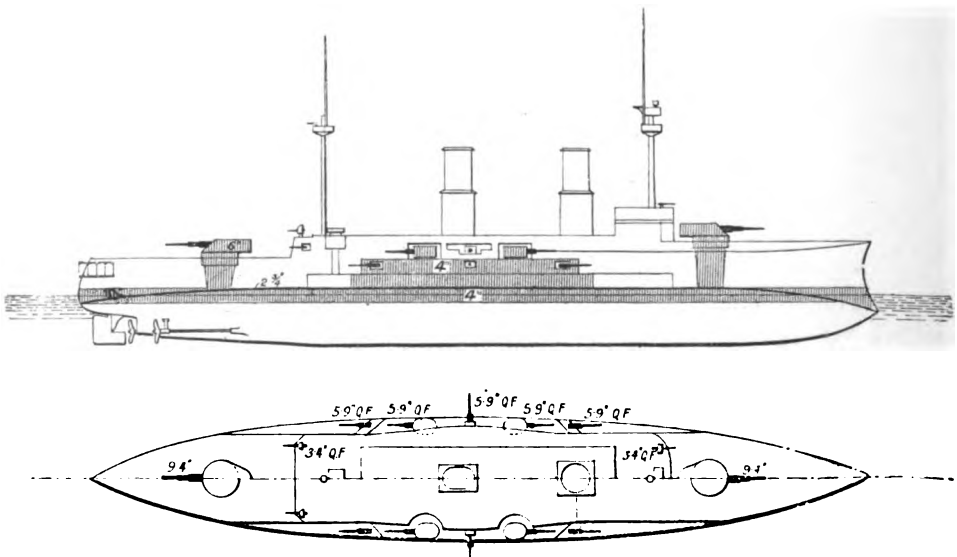
Friedrich Karl.



Length, 393 ft. : 8878 tons : Speed, 20.3—20.5 knots : Completed, 1903-1904 ;
 Armament 4- 8.2 in., 10-6 in., 12-3.4 in., 14-1.4 in

See page 189.

Prinz Heinrich.



Length, 396 ft. : 8750 tons : Speed 20 knots : Completed, 1902 ;
 Armament, 2-9.4 in., 10-5.9 in., 10-3.4 in., 10-1.4 in.

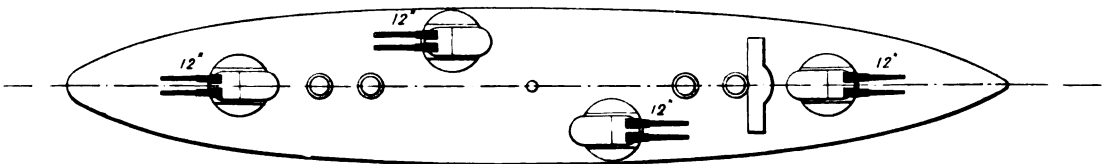
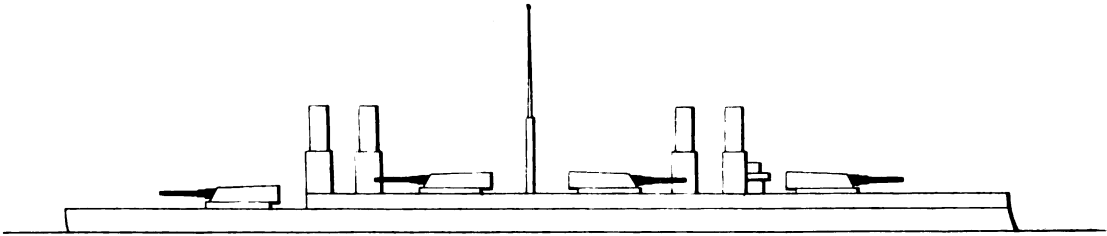
See page 189

ITALY.

BATTLESHIPS.

"A."

Design uncertain.



Length, 492 ft. ; 19,000 tons ; Speed, 24 knots ; Building ;
Armament, 8—12 in., 18—4·7 in.

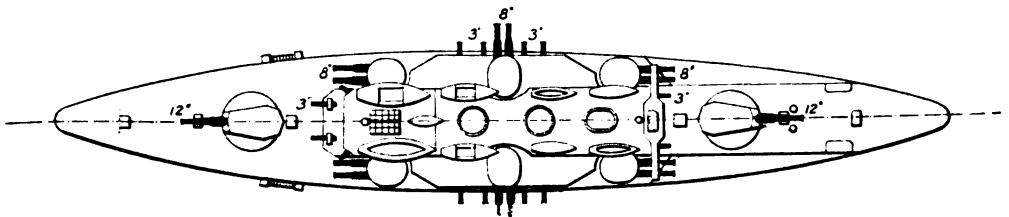
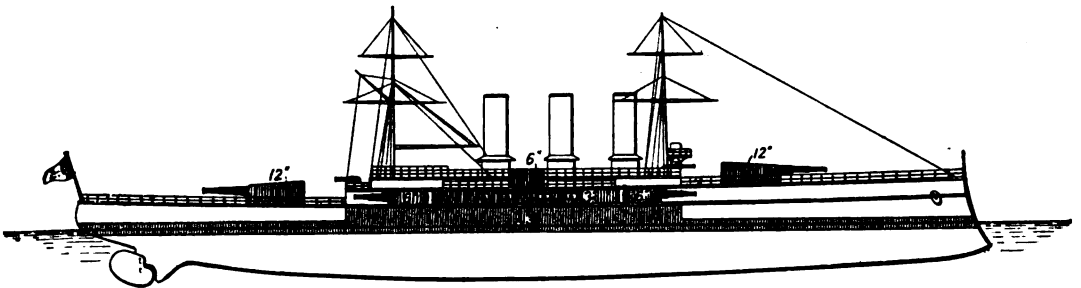
See page 195.

Napoli.

Regina Elena.

Roma.

Vittorio Emanuele.



Length, 436 ft. ; 12,425 tons ; Speed, 22 knots ; Completed, 1907 ; Building ;
Armament, 2—12 in., 12—8 in., 12—3 in., 12—1·8 in.

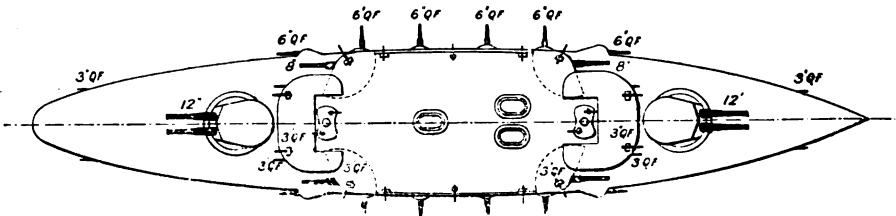
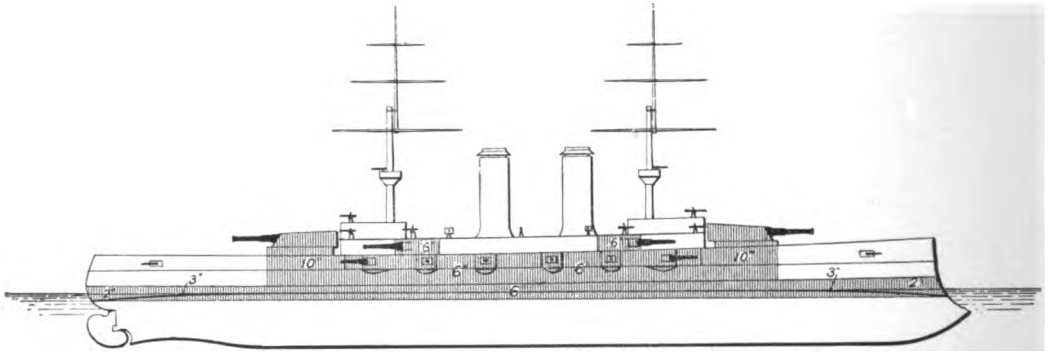
See page 195.

ITALY.

BATTLESHIPS.

Benedetto Brin.

Regina Margherita.

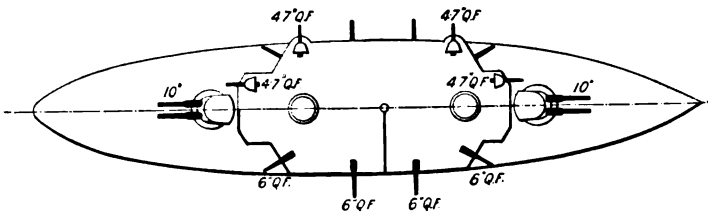
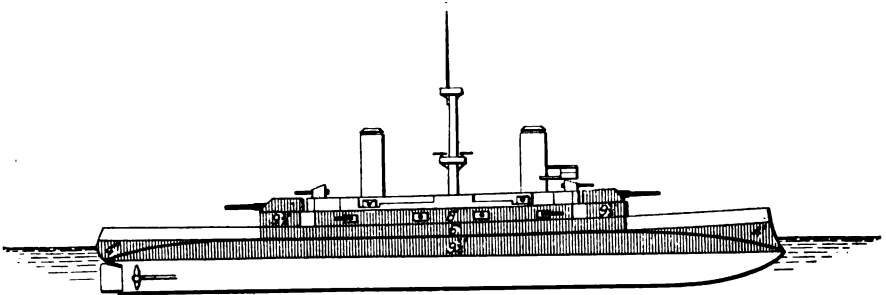


Length, 426 ft. ; 13,214 tons ; Speed, 19·5-20·2 knots ; Completed, 1904 ;
Armament, 4—12 in., 4—8 in., 12—6 in., 16—3 in., 8—1·8 in.

See page 195.

Ammiraglio di St. Bon.

Emanuele Filiberto.



Length, 344 ft. ; 9645 tons ; Speed, 18·3 knots ; Completed, 1901-1902 ;
Armament, 4—10 in., 8—6 in., 8—4·7 in., 2—2·9 in., 8—2·2 in., 12—1·4 in.

See page 195.

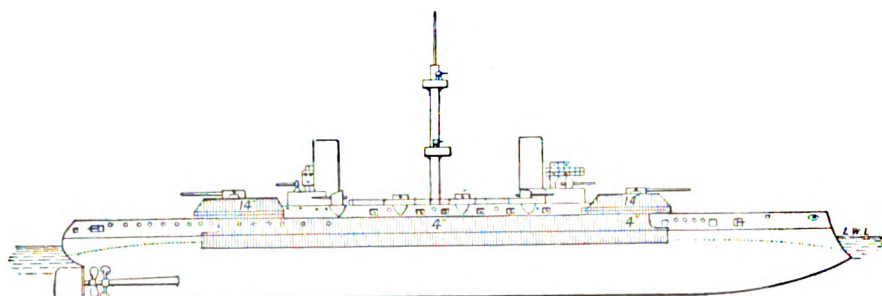
ITALY.

BATTLESHIPS.

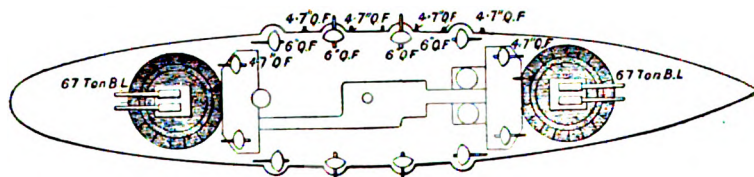
Re Umberto.

Sardegna.

Sicilia.



Note, *Sardegna* is 9 ft 10 in longer and 3 ft 3 in broader than the other two.



Length, 400-411 ft ; 18,087-13,673 tons ; Speed, 19-20.1 knots ; Completed, 1893-1895 ;
Armament, 4-67 ton, 8-6 in., 16-4.7 in., 2-2.9 in. and numerous smaller guns.

See page 196.

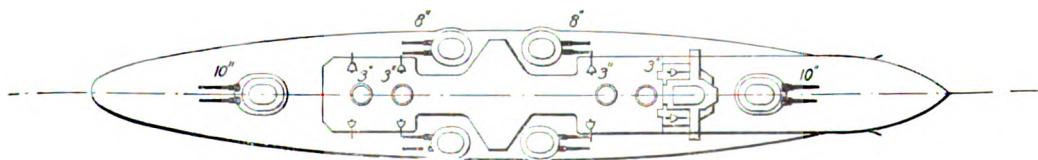
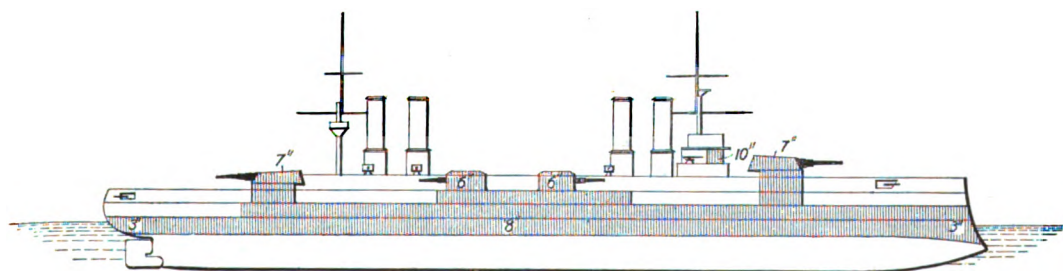
ARMOURD CRUISERS.

Amalfi.

Pisa.

S. Giorgio.

S. Marco.

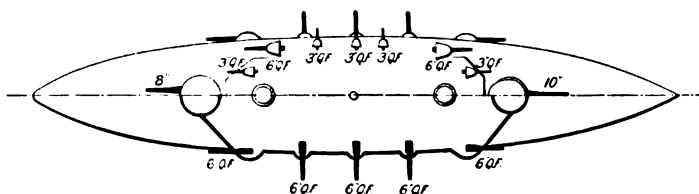
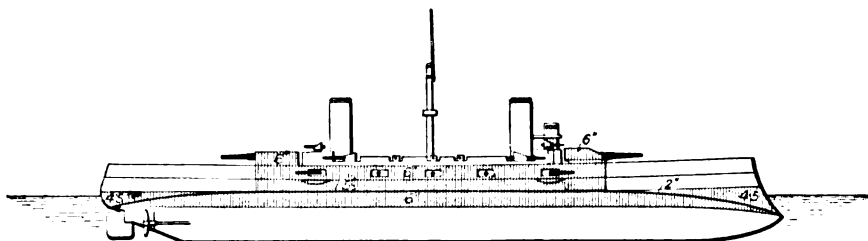


Length, 430 ft. ; 9832 tons ; Speed, 22.5-23 knots ; Building ;
Armament, 4-10 in., 8-8 in., 16-3 in., 8-1.8 in.

See page 195.

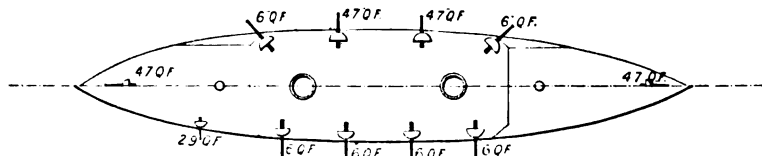
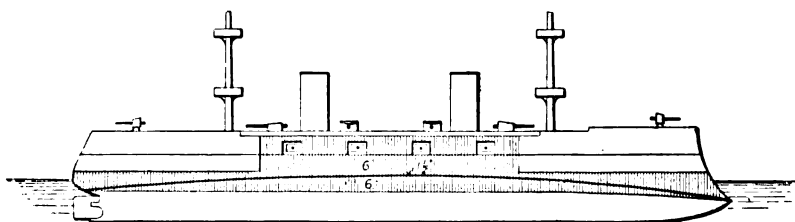
ARMoured CRUISERS.

Varese.



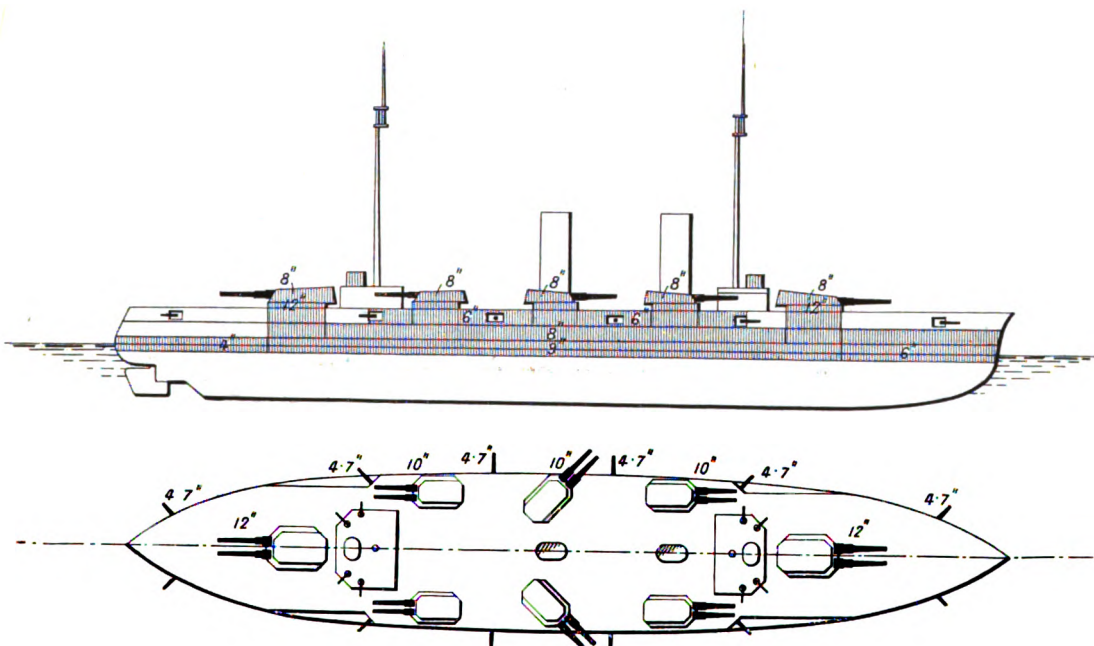
See page 195.

Vettor Pisani.



See page 195.

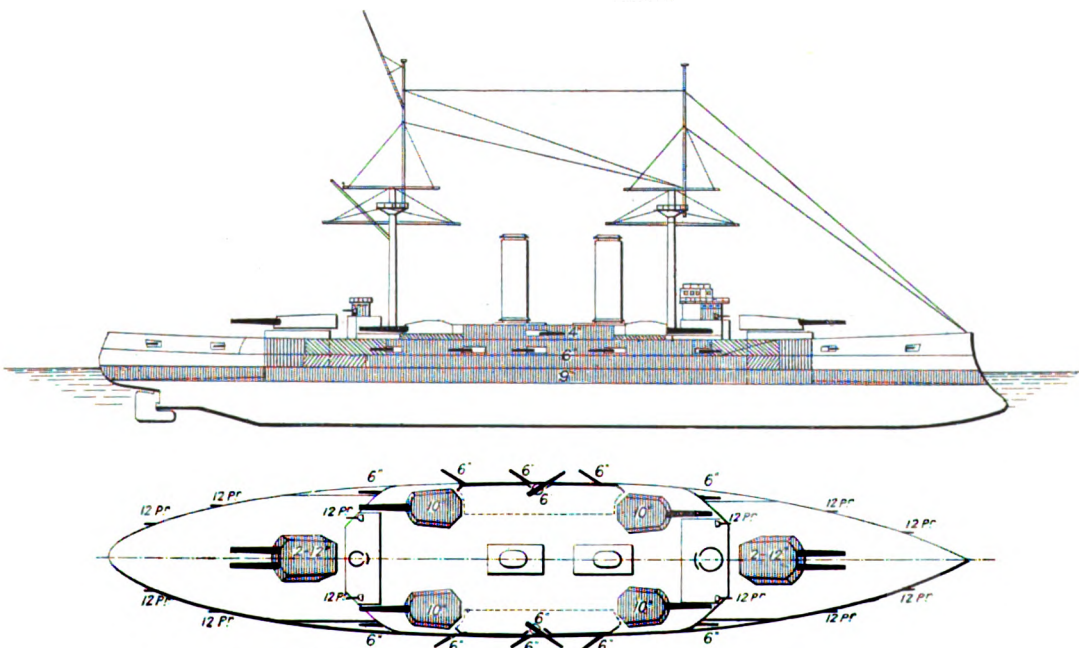
JAPAN.
BATTLESHIPS.
Satsuma.



Length, 482 ft. ; 19,350 tons ; Speed, 20.5 knots ; Building ;
Armament, 4—12 in., 12—10 in., 12—4.7 in.

See page 200.

Kashima. Katori.



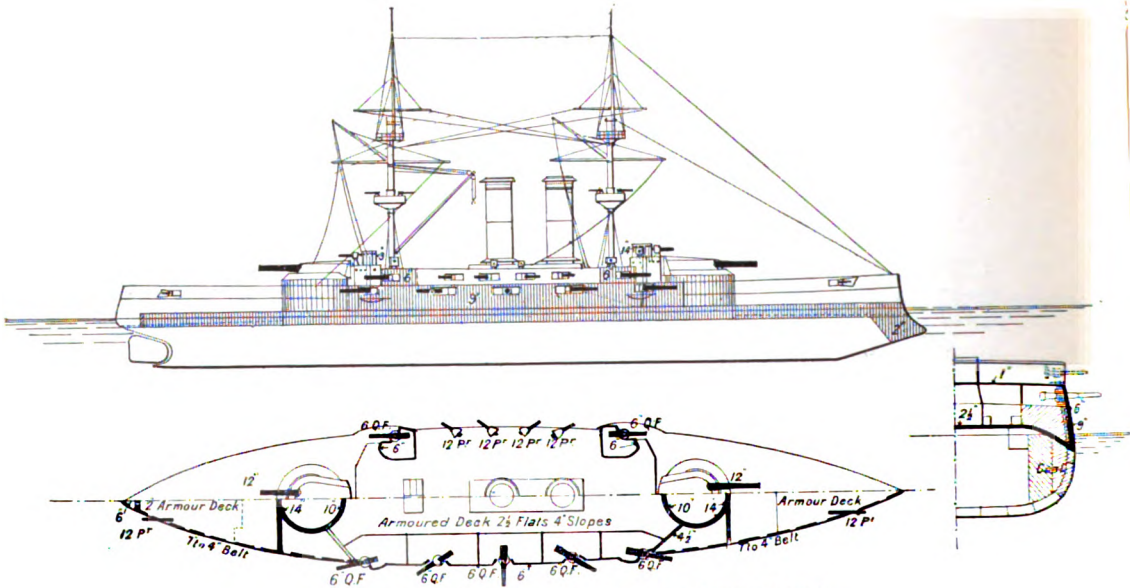
Length, 420—425 ft. ; 15,950—16,400 tons ; Speed, 19.5 knots ; Completed, 1906 ;
Armament, 4—12 in., 4—10 in., 12—6 in., 20—12 pr.

See page 200.

JAPAN.

BATTLESHIPS.

Mikasa.



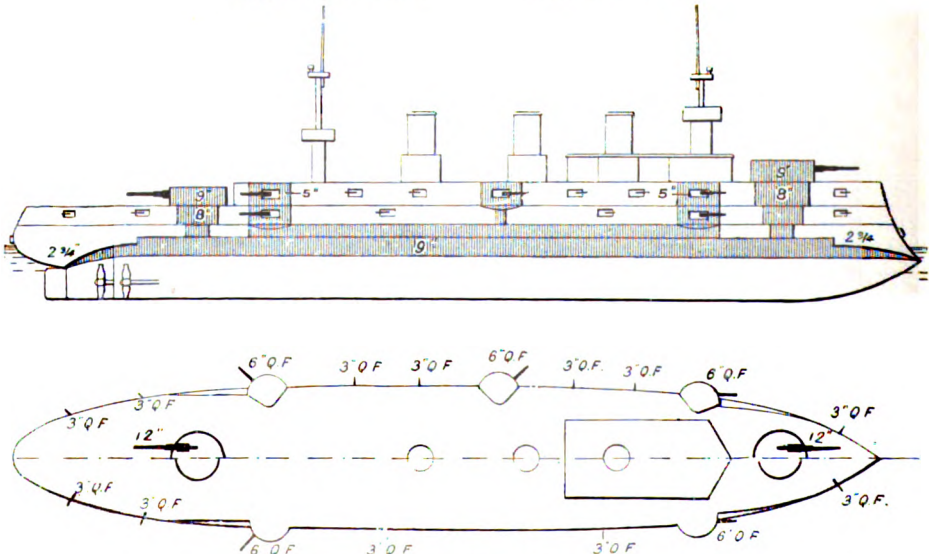
Length, 400 ft. ; 15,200 tons : Speed, 18.5 knots : Completed, 1902 ;
 Armament, 4—12 in., 4—10 in., 10—6 in., 20—12 pr., 12 small.

See page 200.

NOTE.—4—10 in. guns have been substituted for 4—6 in. on upper deck.

Sagami late Peresviet.

Suo late Pobieda.



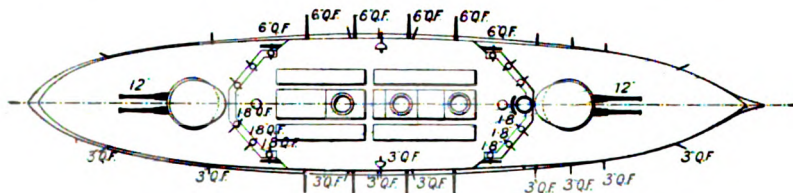
Note: In the "Pobieda" the Belt Extends the Full Length of the Ship

Length, 401 ft. ; 12,674 tons : Speed, 18 knots : Completed, 1901 ;
 Armament, 4—12 in., 10—6 in., 16—12 pr., 10—3 pr., 17—1 pr.

See page 209.

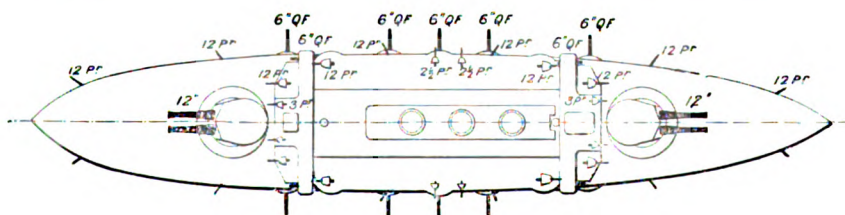
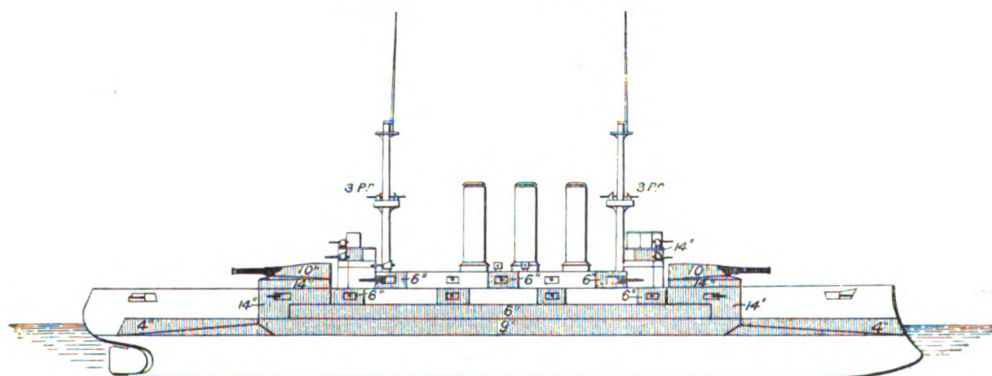
See Plate 48 for Iwami, ex Orel.

BATTLESHIPS.

[illegible]

See page 199.

Shikishima.

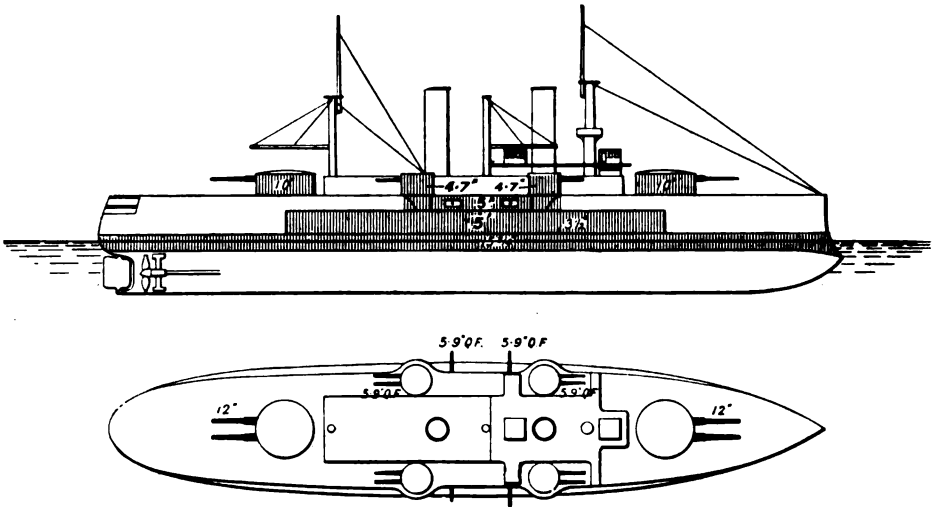


See page 199.

JAPAN.

BATTLESHIPS.

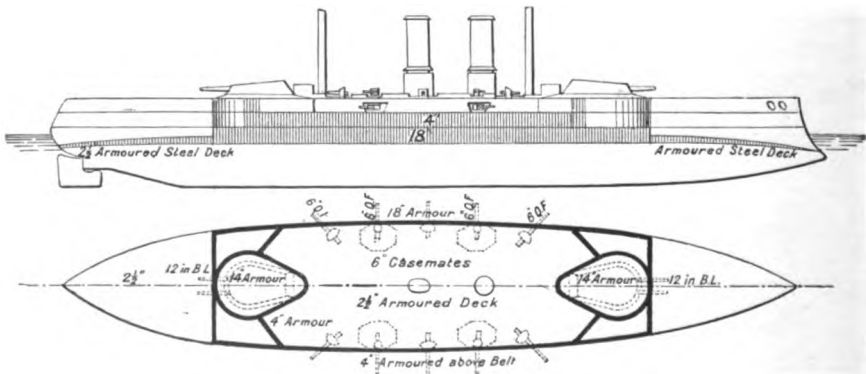
Tango late Poltava.



Length, 367 ft. ; 10,960 tons ; Speed, 16 knots ; Completed, 1898 ;
Armament, 4—12 in., 12—5.9 in., 14 smaller.

See page 200.

Fuji.



Length, 374 ft. ; 12,320 tons ; Speed, 19.2 knots ; Completed, 1897 ;
Armament, 4—12 in., 10—6 in., 20—3 pr., 4—4.5 pr.

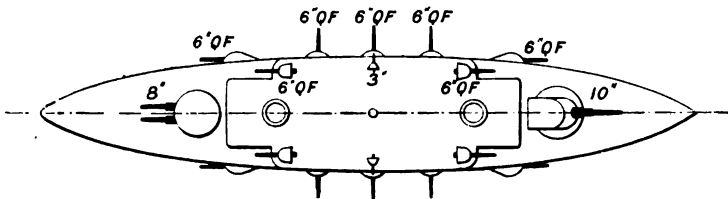
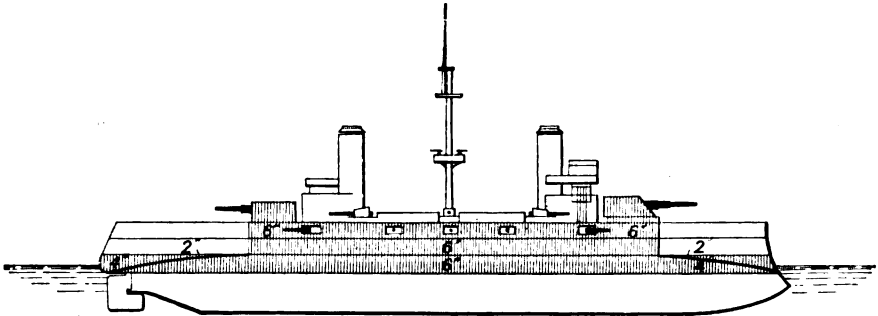
See page 190.

JAPAN.

ARMoured CRUISERS.

Kasuga.

Nisshin.



*The Nisshin has 2-8 in. guns
in fore barbette.*

Length, 344 ft. ; 7200—7700 tons ; Speed, 20 knots ; Completed, 1900 ;
Armament, 1—10 in., 2—8 in., 14—6 in., 10—3 in., 6—1-8 in.

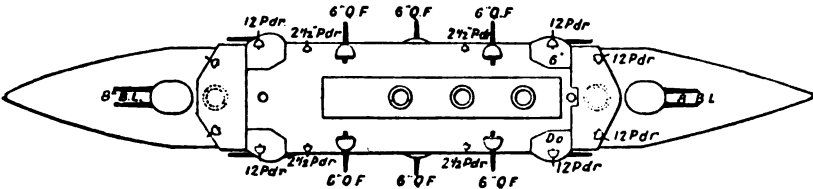
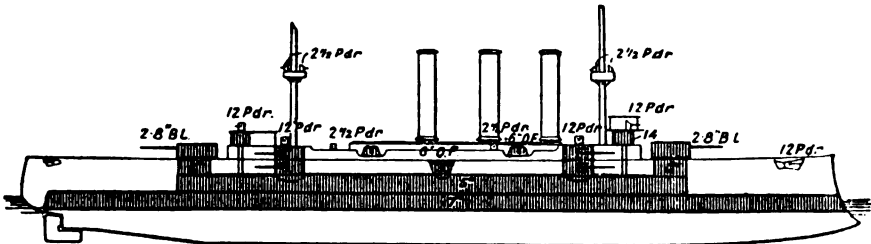
See page 200.

Idzumo.

*Adzuma.

Iwaki.

*Yakumo.



Length, 400—431 ft. ; 9436—9850 tons ; Speed, 20—22 knots ; Completed, 1901 ;
Armament, 4—8 in., 14—6 in., 12—12 pr., 8 smaller.

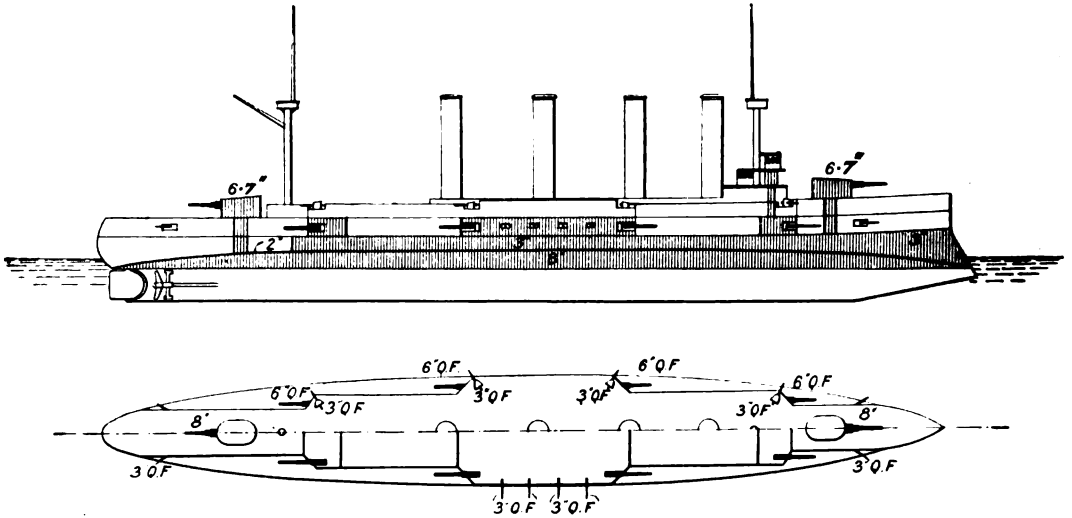
* 12—6 in. guns.

See page 199.

JAPAN.

ARMoured CRUISERS.

Aso late Bayan.

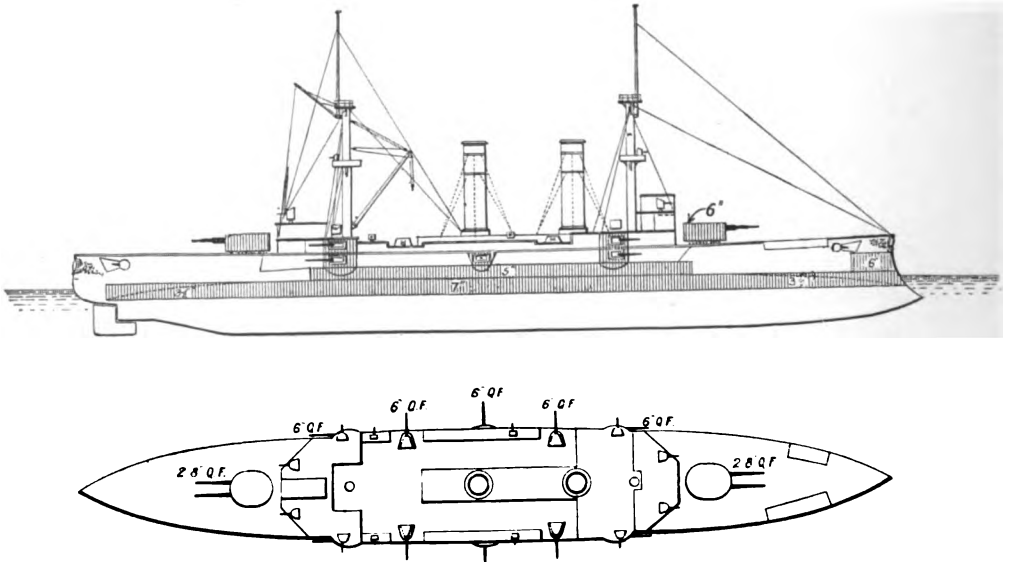


Length, 443 ft. ; 7726 tons ; Speed, 22 knots ; Completed, 1902 ;
Armament, 2—8 in., 8—6 in., 32—3 in., 20—3 pr., 6—1 pr.

See page 199.

Asama.

Tokiwa.



Length, 408 ft. ; 9700 tons ; Speed, 22·1—23 knots ; Completed, 1899 ;
Armament, 4—8 in., 14—6 in., 12—12 pr., 8—2·5 pr.

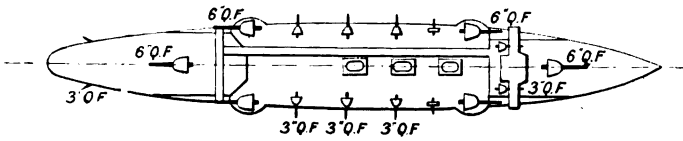
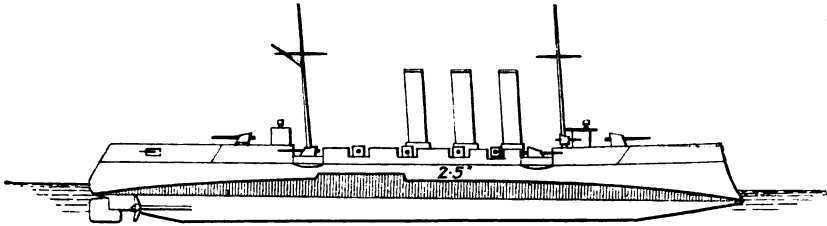
See page 190.

JAPAN.

CRUISERS.

Niitaka.

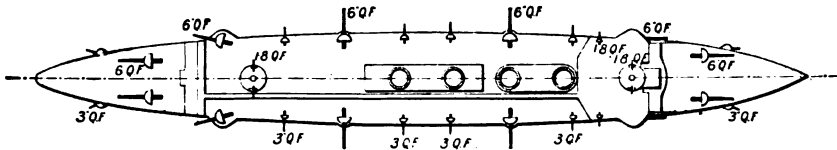
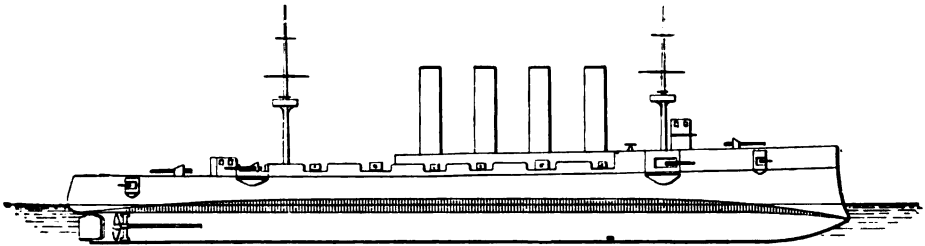
Tsushima.



Length, 235 ft. ; 3365 tons ; Speed, 20 knots ; Completed, 1905 ;
Armament, 6—6 in., 10—3 in., 4—2.5 pr.

See page 201.

85ya late Waryag.



Length, 420 ft. ; 6500 tons ; Speed, 23 knots ; Completed, 1900 ;
Armament, 12—6 in., 12—12 pr., 6—3 pr.

See page 202.

NETHERLANDS.

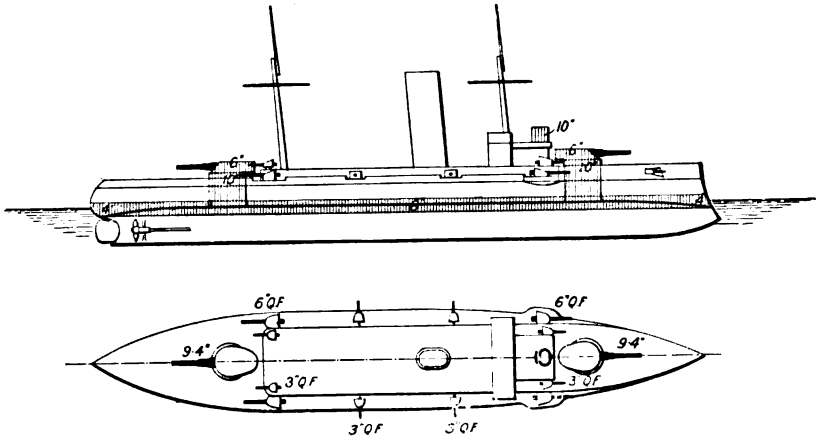
COAST DEFENCE SHIPS.

De Ruyter.

Hertog Hendrik.

Koningin Regentes.

Marten Tromp.



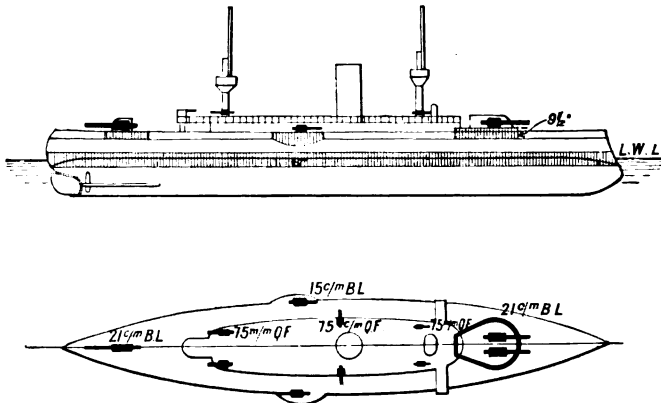
Length, 317 ft. ; 5014—5211 tons ; Speed, 16·5 knots ; Completed, 1902—1906 ;
Armament, 2—9·4 in., 4—6 in., 10—3 in., 4—1·4 in.

See page 203.

Evertsen.

Kortenaer.

Piet Hein.

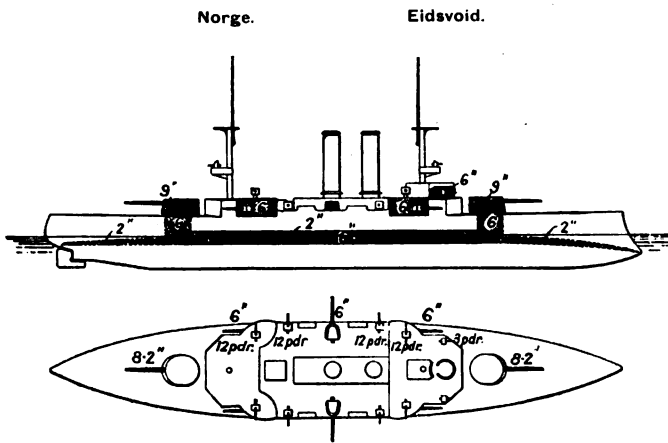


Length, 283 ft. ; 3464 tons ; Speed, 16 knots ; Completed, 1906 ;
Armament, 3—8·2 in., 2—5·9 in., 6—2·9 in., 8—1·4 in.

See page 203.

NORWAY.

BATTLESHIPS.



Length, 290 ft. ; 3847 tons ; Speed, 16.5 knots ; Completed, 1901 ;
 Armament, 2—8.2 in., 6—6 in., 8—12 pr., 6—3 pr.

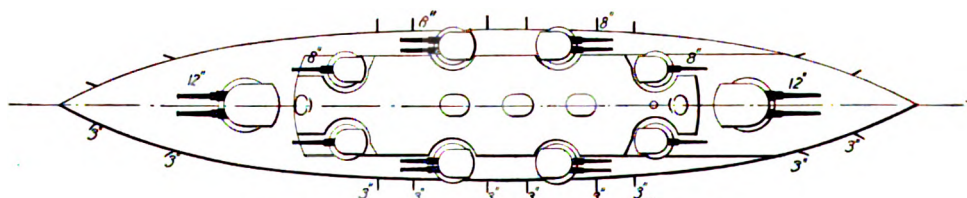
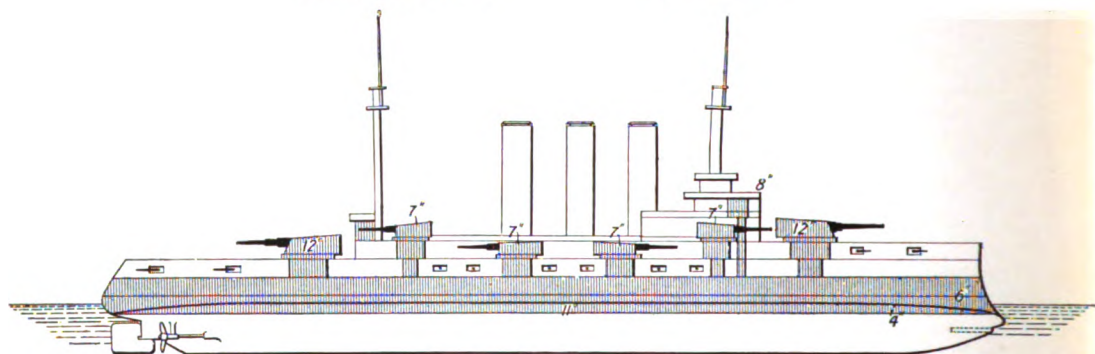
See page 205.

RUSSIA.

BATTLESHIPS.

Andrei Pervozvannyi.

Imperator Pavel.

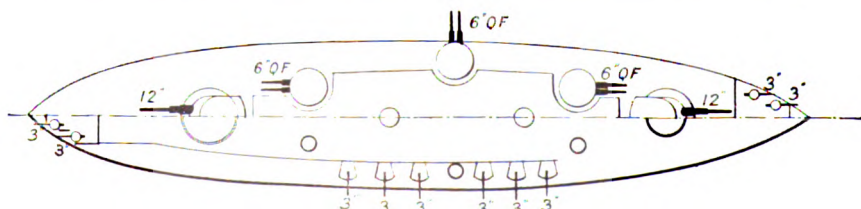
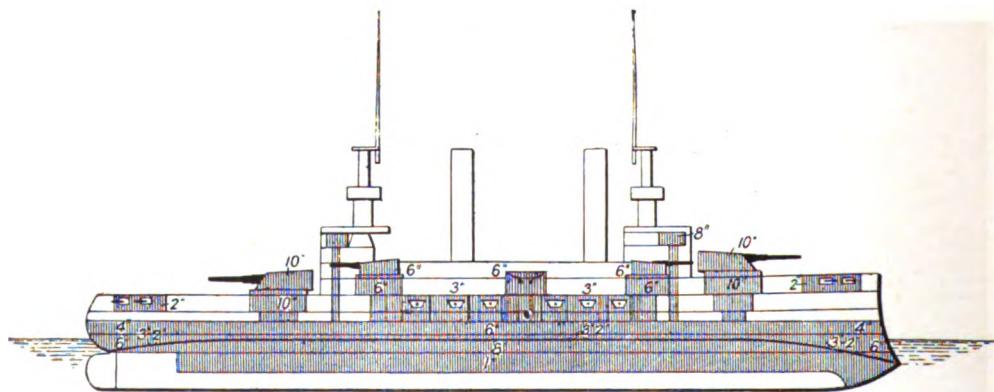


Length, 430 ft. ; 17,200 tons ; Speed, 18 knots ; Building ;
Armament, 4—12 in., 12—8 in., 20—4·7 in., 14 smaller.

See page 207.

Slava.

*Orel.



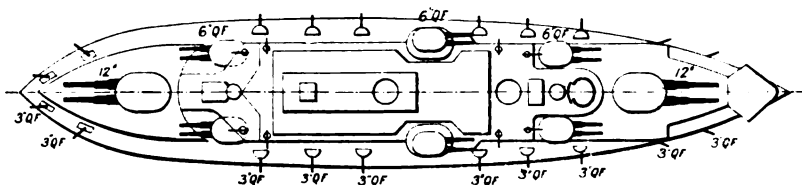
Length, 367 ft. ; 13,500 tons ; Speed, 18 knots ; Completed, 1906 ;
Armament, 4—12 in., 12—6 in., 20—3 in., 20—3 pr., 6—1 pr.

* Transferred to Japan. Renamed Iwami.

See page 208.

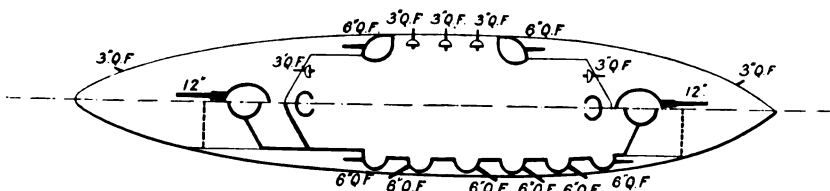
PLATE 48.

BATTLESHIPS.



See page 207.

A detailed line drawing of the USS Albatross (SS-340) in profile, showing its hull number 340, various masts, and a 10-inch gun turret.



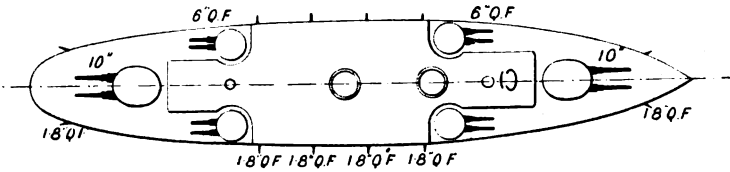
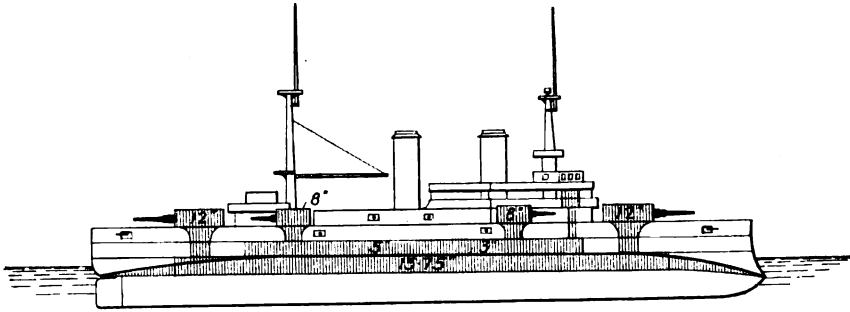
See page 208.

2

RUSSIA.

BATTLESHIPS.

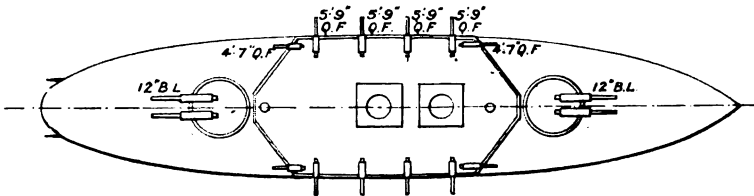
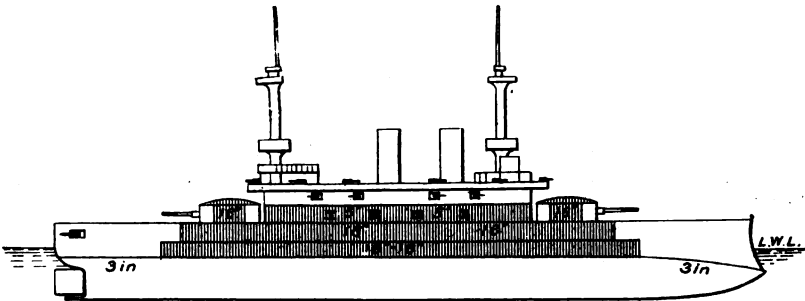
Rostislav.



Length, 341 ft. ; 8880 tons ; Speed, 16 knots ; Completed, 1899 ;
Armament, 4—10 in., 8—6 in., 12—1·8 in., 4—1·5 in.

See page 208.

Tria Sviatitelia.



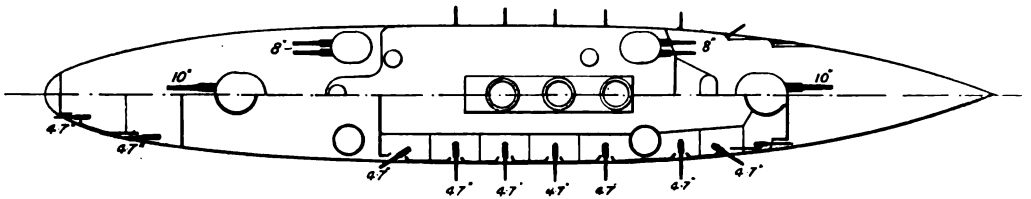
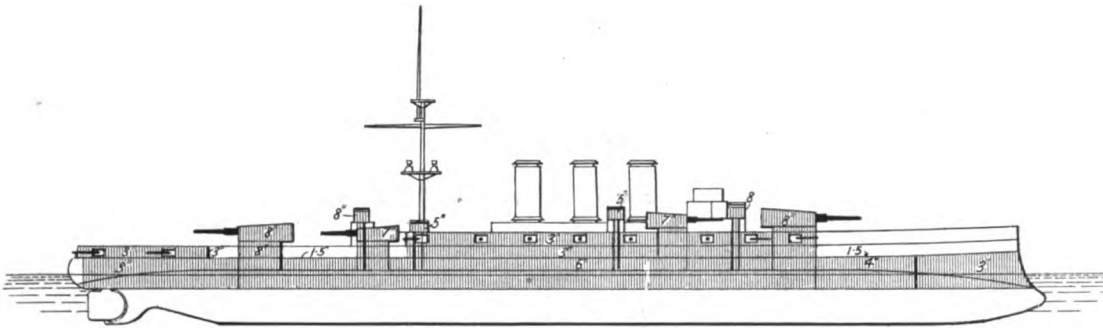
Length, 357 ft. ; 13,318 tons ; Speed, 18 knots ; Completed, 1896 ;
Armament, 4—12 in., 8—5·9 in., 4—4·7 in., 56 smaller.

See page 208.

RUSSIA.

ARMoured CRUISERS.

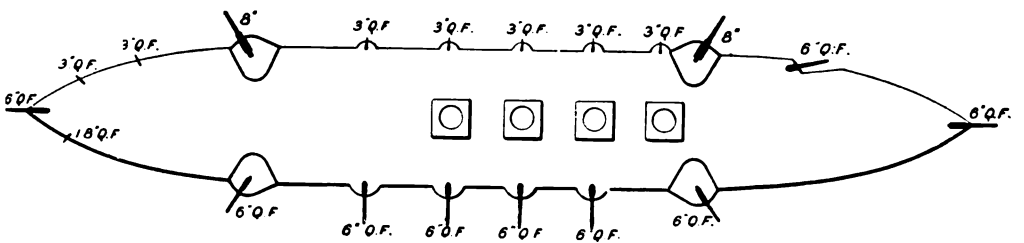
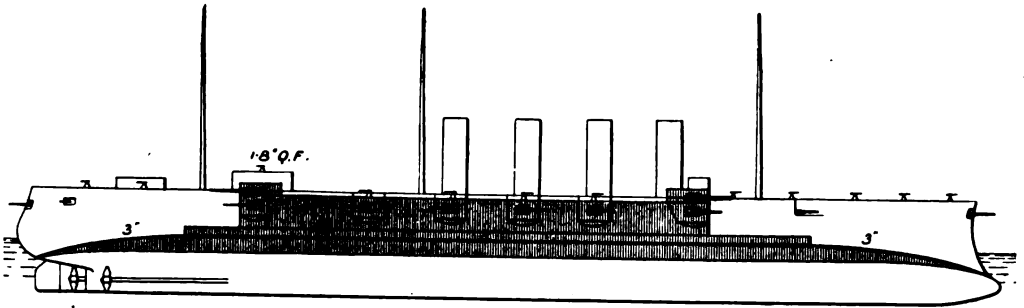
Rurik.



Length, 490 ft. ; 15,170 tons ; Speed, 21 knots ; Completed, 1907
Armament, 4—10 in., 8—8 in., 20—4·7 in., 18 smaller.

See page 208.

Gromoboi.



Length, 473 ft. ; 12,336 tons ; Speed, 20 knots ; Completed, 1900 ;
Armament, 4—8 in., 16—6 in., 20—3 in., 36 smaller.

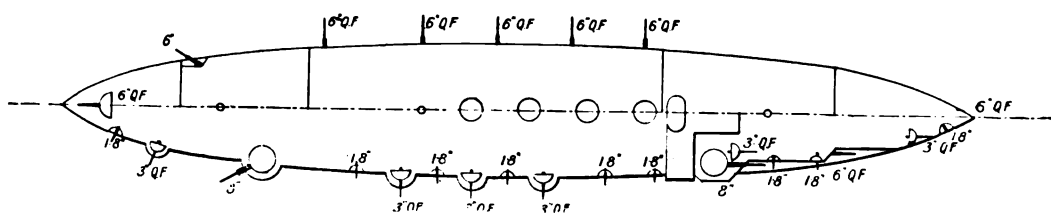
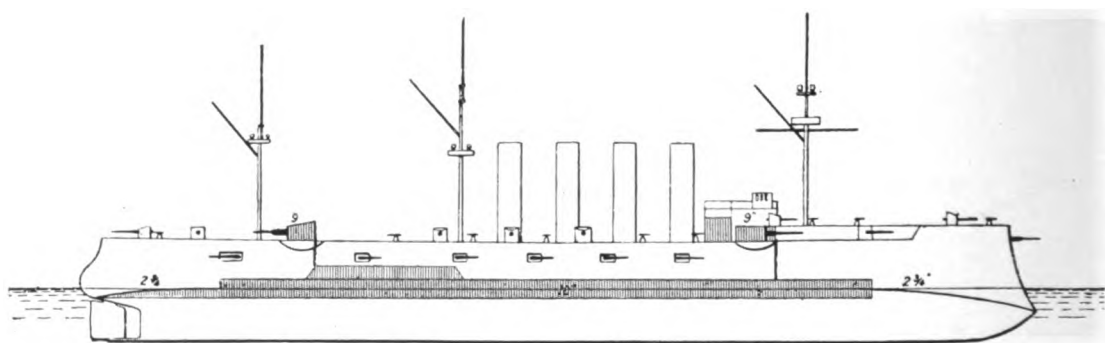
See page 207.

PLATE 51.

RUSSIA.

ARMoured CRUISER.

Rossia.



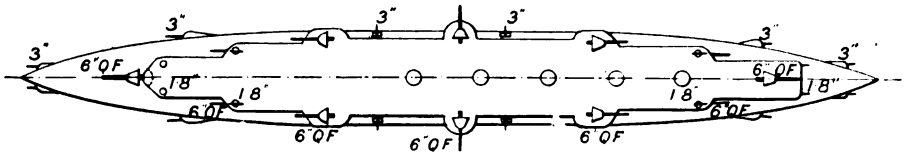
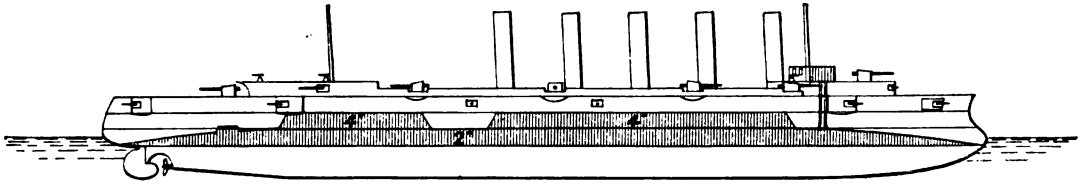
Length, 480 ft. ; 12,130 tons ; Speed, 20 knots ; Completed, 1898
Armament, 4—8 in., 16—6 in., 12—3 in., 36 smaller.

See page 208.

RUSSIA.

CRUISERS.

Askold.

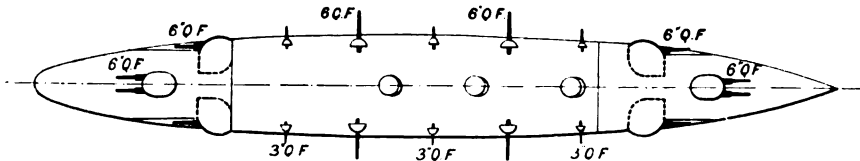
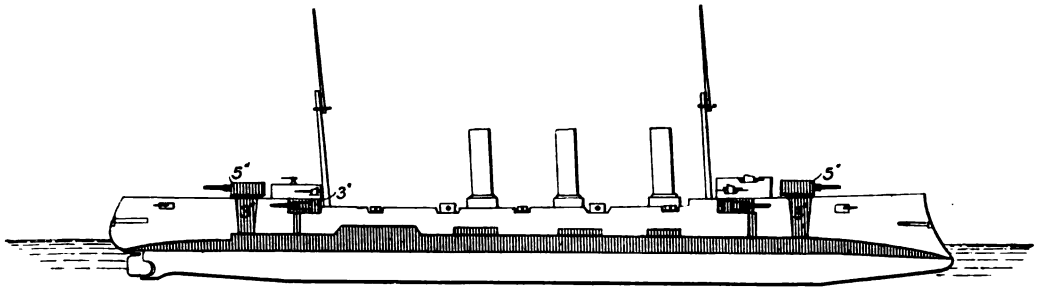


Length, 420 ft. ; 5905 tons ; Speed, 23·8 knots ; Completed, 1901 ;
Armament, 12—6 in., 12—3 in., 8—1·8 in., 2—1·4 in.

See page 209.

Bogatyr.

Oleg.



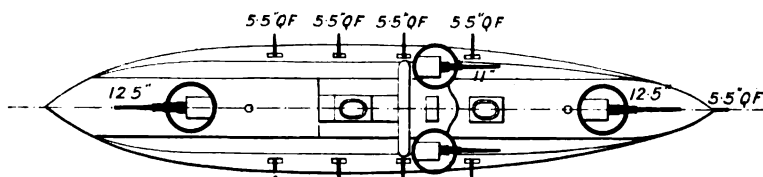
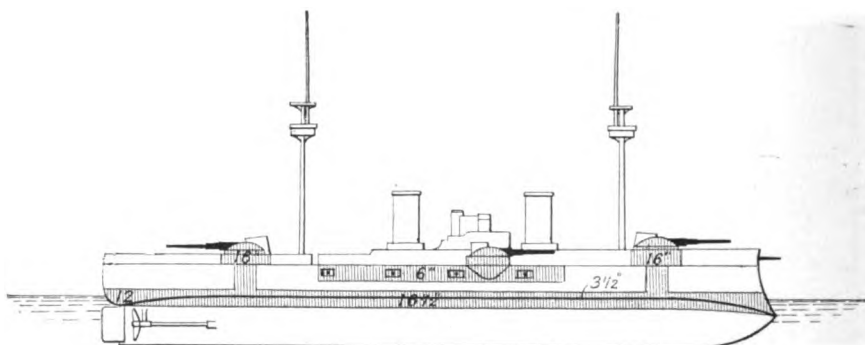
Length, 417—440 ft. ; 6645—6675 tons ; Speed, 23—24 knots ; Completed, 1901—1904 ;
Armament, 12—6 in., 12—3 in., 6—1·8 in.

See page 209.

SPAIN.

BATTLESHIP.

Pelayo.

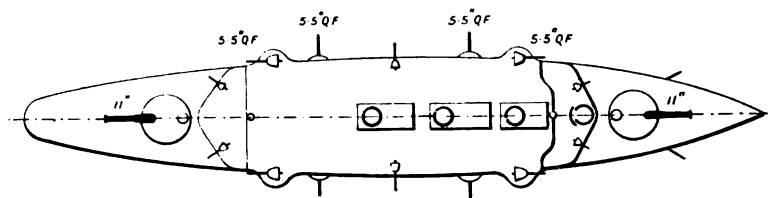
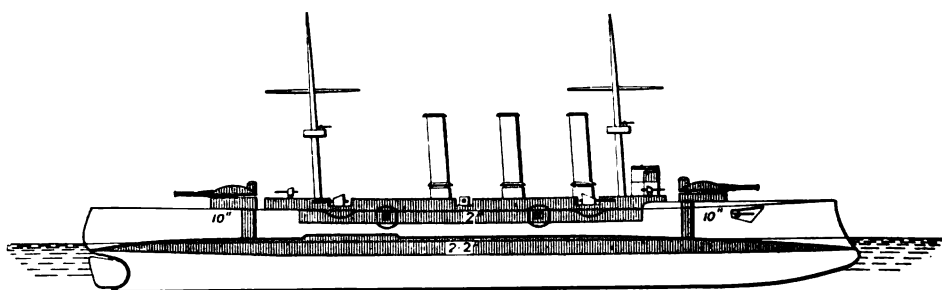


Length, 330 ft. ; 9744 tons ; Speed, 16 knots ; Completed, 1890 ;
Armament, 2—12.5 in., 2—11 in., 9—5.5 in., 6 small.

See page 212.

ARMoured CRUISER.

Emperador Carlos V.



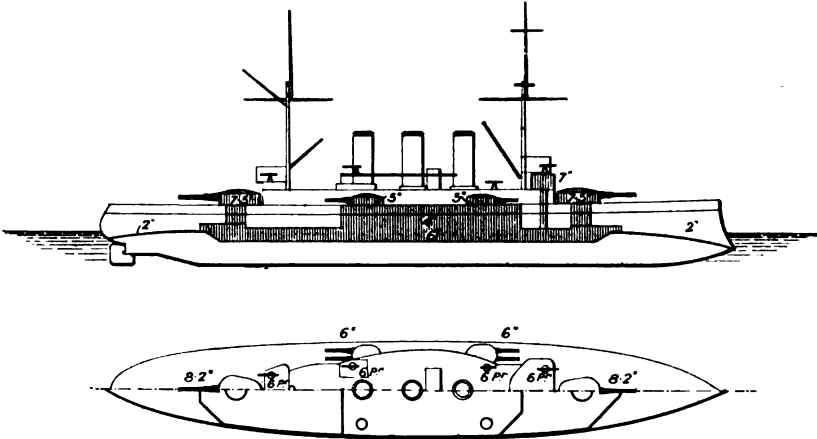
Length, 380 ft. ; 9089 tons ; Speed, 20 knots ; Completed, 1898 ;
Armament, 2—11 in., 8—5.5 in., 4—3.9 in., 2—2.7 in., 4—2.2 in.

See page 212.

SWEDEN.

BATTLESHIP.

Oskar II.



Length, 314 ft. ; 4203 tons ; Speed, 18 knots ; Completed, 1907 ;
Armament, 2—8.2 in., 8—6 in., 10—2.2 in., 2—1.4 in.

See page 214.

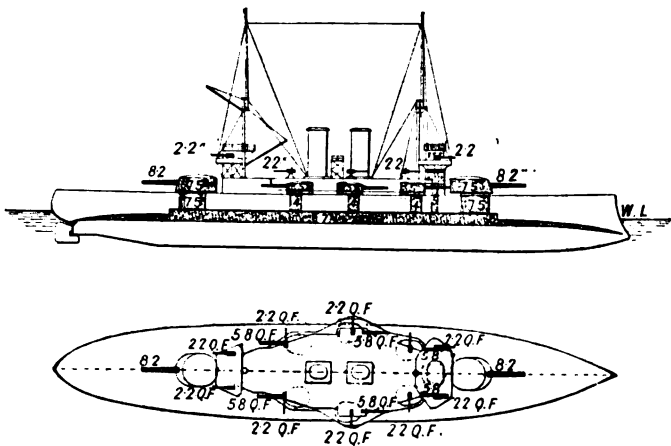
COAST DEFENCE SHIPS.

Aeran.

Manligheten.

Tapperheten.

Wasa.



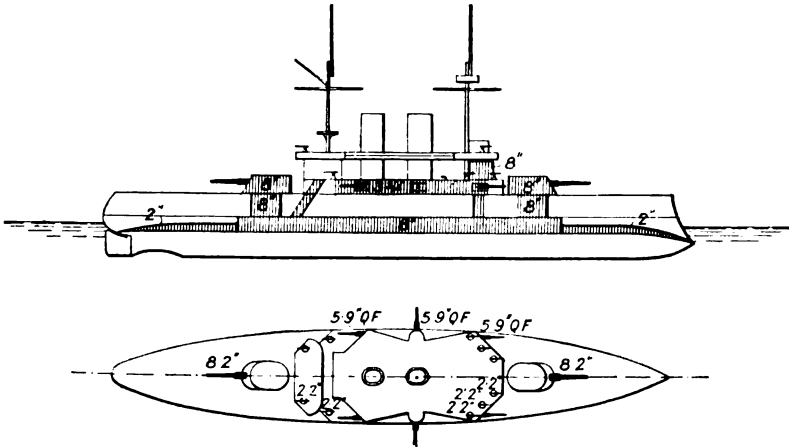
Length, 287 ft. ; 3612 tons ; Speed, 16.5-17.2 knots ; Completed, 1901-1903 ;
Armament, 2—8.2 in., 6—5.8 in., 10—2.2 in., 2—1.4 in.

See page 214

SWEDEN.

COAST DEFENCE SHIP.

Dristigheten.

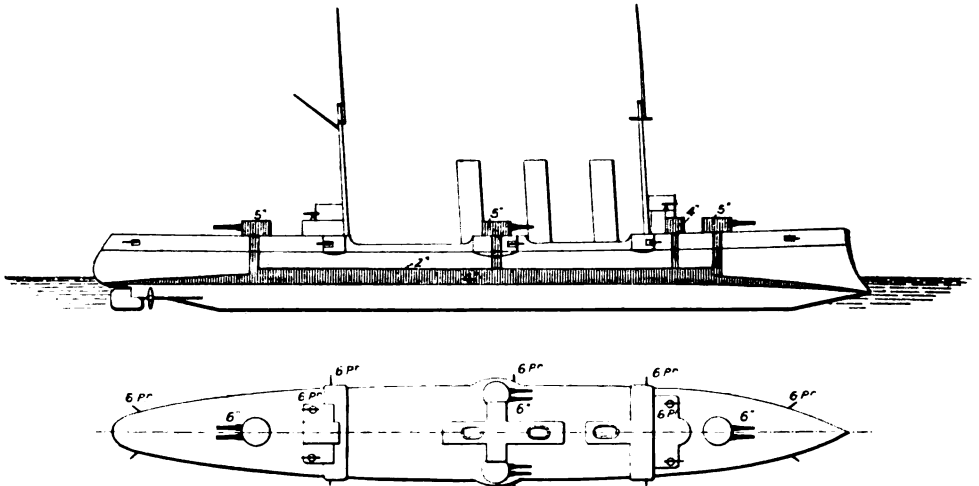


Length, 285 ft. : 3445 tons : Speed, 16.5 knots : Completed, 1901 ;
Armament, 2—8.2 in., 6—5.9 in., 10—2.2 in.

See page 214.

ARMoured CRUISER.

Fylgia.



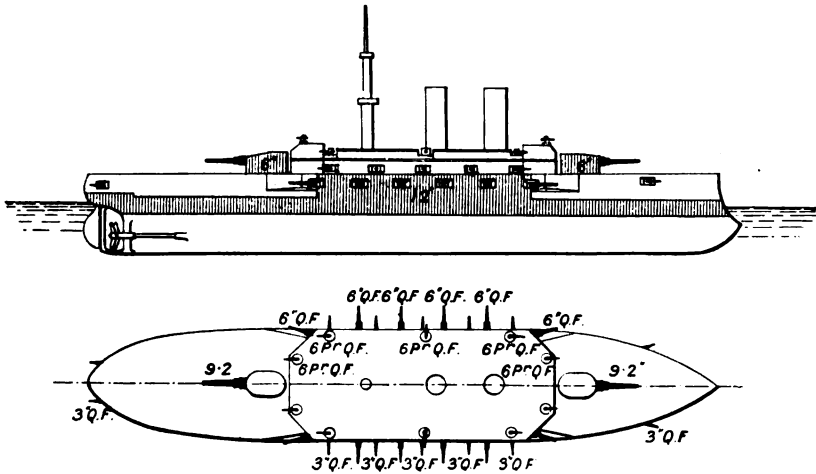
Length, 377 ft. : 4100 tons : Speed, 22.5 knots : Completed, 1907 ;
Armament, 8—6 in., 14—2.2 in., 3—1.4 in.

See page 214.

TURKEY.

BATTLESHIP.

Messoudieh.



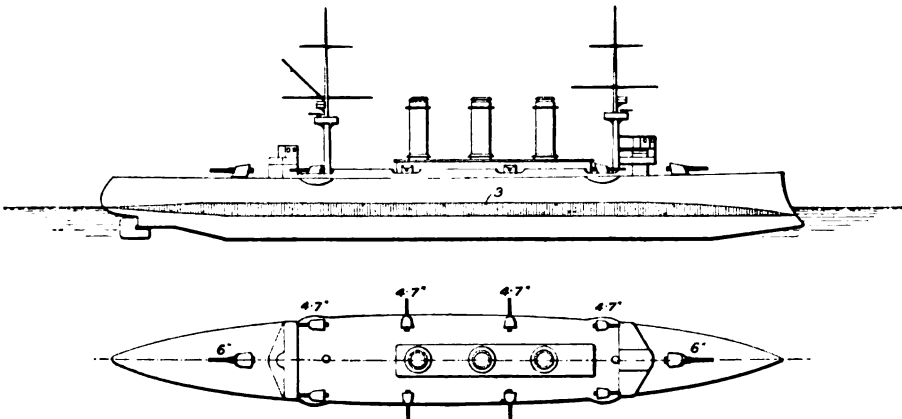
Length, 331 ft. ; 9120 tons ; Speed, 17·5 knots ; Completed, 1901 ;
Armament, 2—9·2 in., 12—6 in., 14—3 in., 10—6 pr., 2—8 pr.

See page 216.

CRUISERS.

Abdul Hamid.

Abdul Medjid.



Length, 331—340 ft. ; 3432—3800 tons ; Speed, 22·2 knots ; Completed, 1904 ;
Armament, 2—6 in., 8—4·7 in., 6—1·8 in.

See page 216.

UNITED STATES.

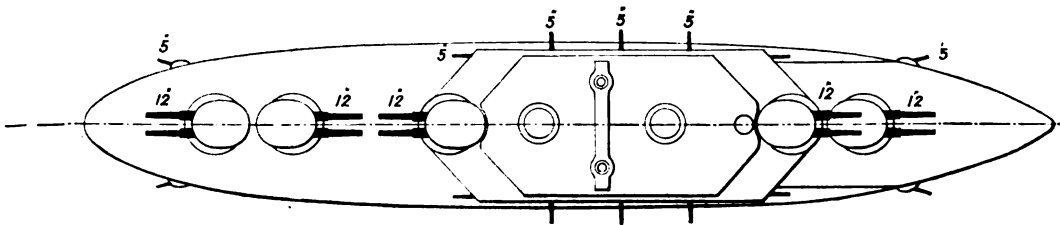
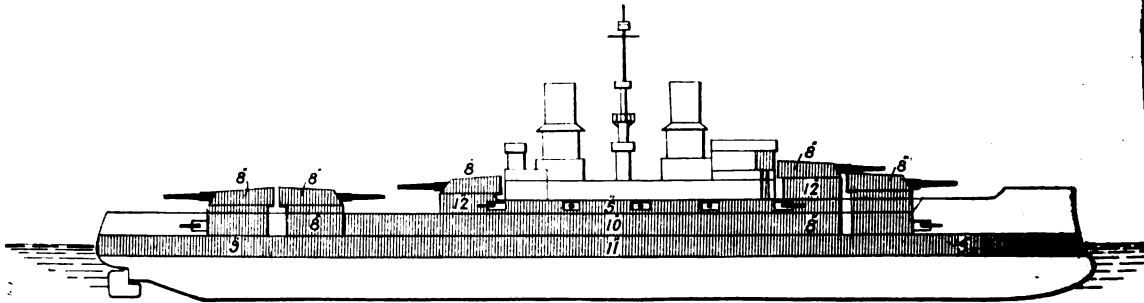
BATTLESHIPS.

Delaware.

Florida.

North Dakota.

Utah.

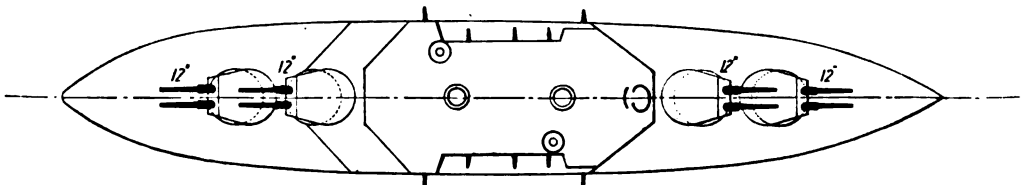
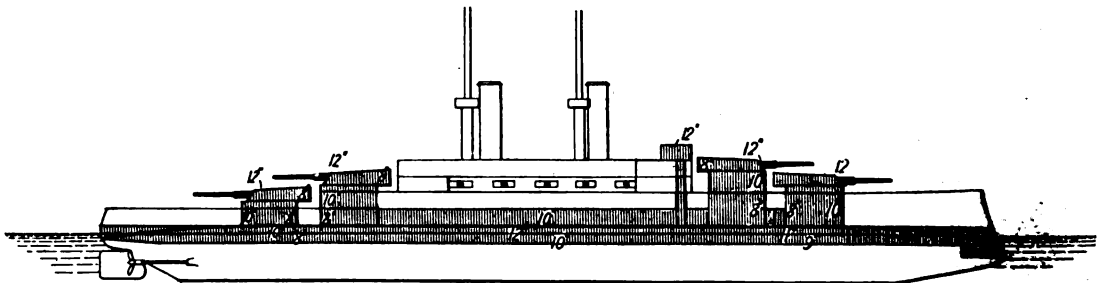


Length, 510 ft. ; 20,000 tons ; Speed, 21 knots ; Building ;
Armament, 10-12 in., 14-5 in., 4-3 pr.
NOTE.—North Dakota has two skeleton masts.

See page 217.

Michigan.

South Carolina.



Length, 450 ft. ; 16,000 tons ; Speed, 18.5 knots ; Building ;
Armament, 8-12 in., 22-3 in., and smaller.

See page 218.

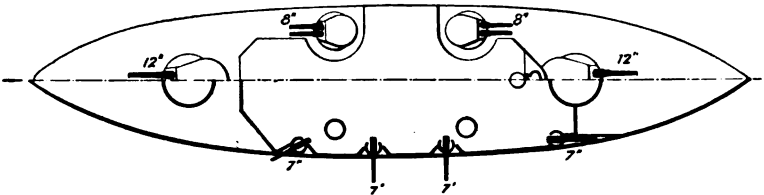
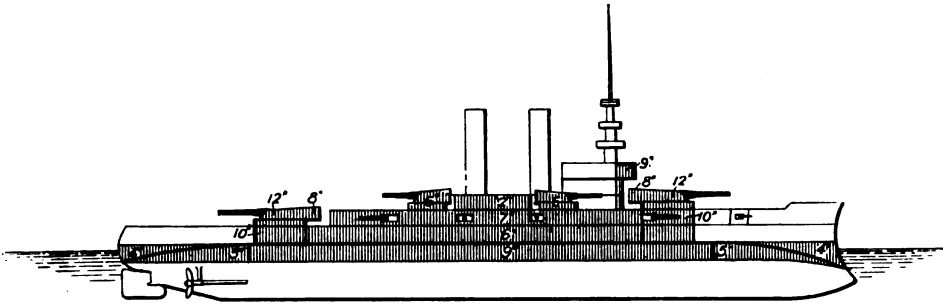
PLATE 58.

UNITED STATES.

BATTLESHIPS.

Idaho.

Mississippi.



Length, 375 ft. ; 13,000 tons ; Speed, 17 knots ; Completed, 1908 ;
Armament, 4—12 in., 8—8 in., 8—7 in., 12—3 in., 6—3 pr., 4—1 pr.

See page 217.

Connecticut.

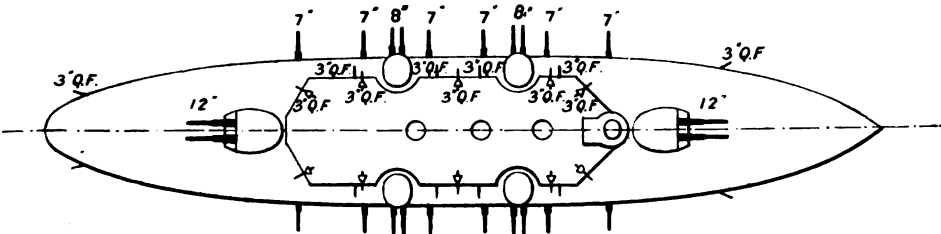
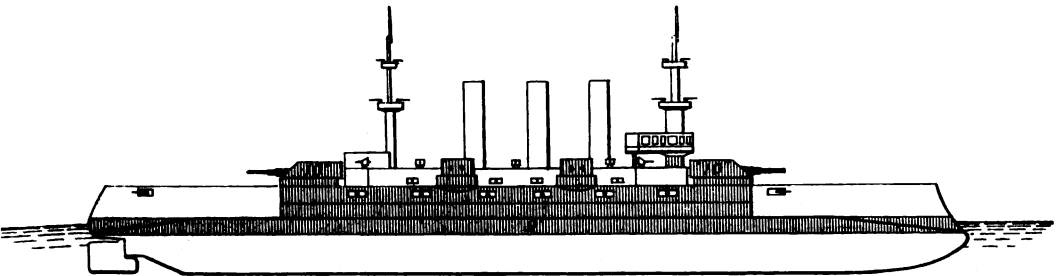
Kansas.

Louisiana.

Minnesota.

New Hampshire.

Vermont.



Length, 450 ft. ; 16,000 tons ; Speed, 18—18.8 knots ; Completed, 1906-1908 ;
Armament, 4—12 in., 8—8 in., 12—7 in., 20—3 in., 12—3 pr., 8—1 pr.

See page 217.

PLATE 59.

UNITED STATES.

BATTLESHIPS.

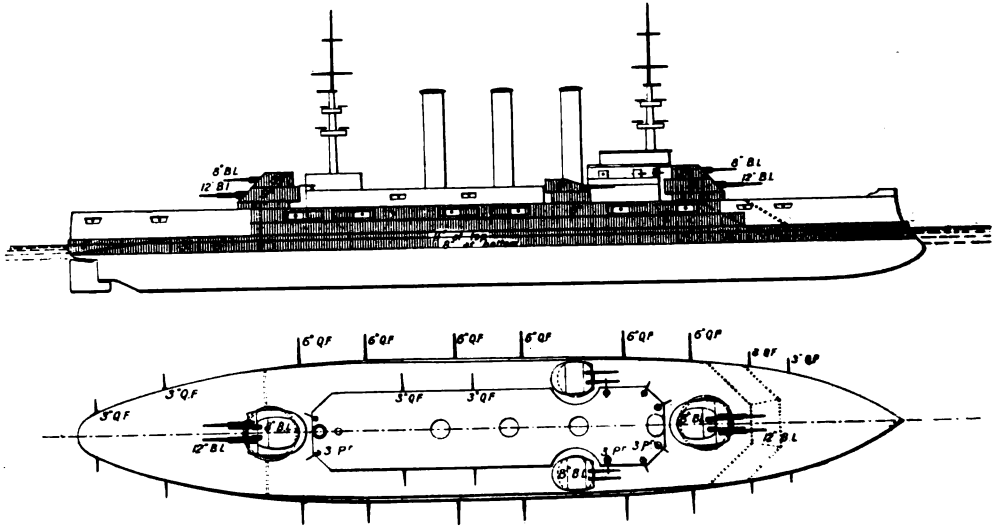
Georgia.

Nebraska.

New Jersey.

Rhode Island.

Virginia.



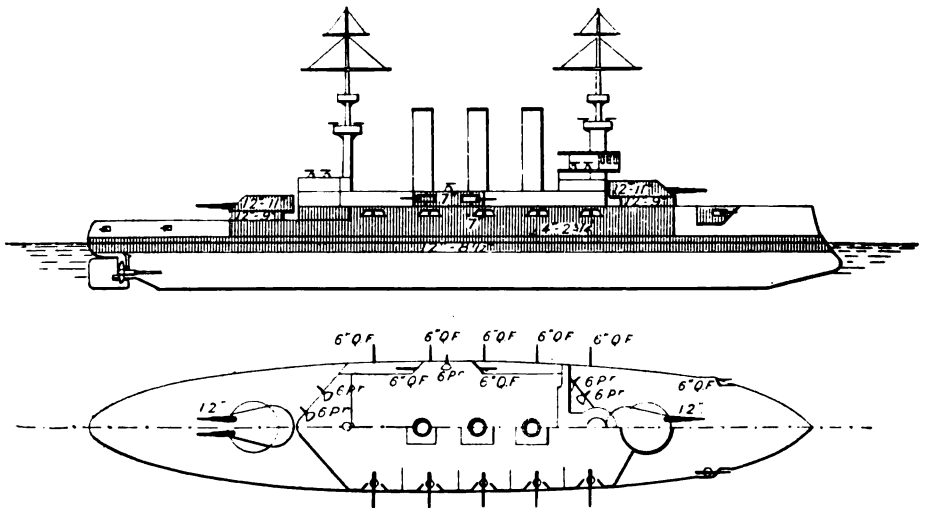
Length, 435 ft. ; 14,948 tons ; Speed, 19-19.4 knots ; Completed, 1905-1906 ;
Armament, 4-12 in., 8-8 in., 12-6 in., 12-3 in., 12-3 pr.

See page 217.

Maine.

Missouri.

Ohio.



Length, 388 ft. ; 12,300-12,440 tons ; Speed, 17.8-18.1 knots ; Completed, 1902-1904 ;
Armament, 4-12 in., 16-6 in., 6-3 in., 8-3 pr.

See page 218.

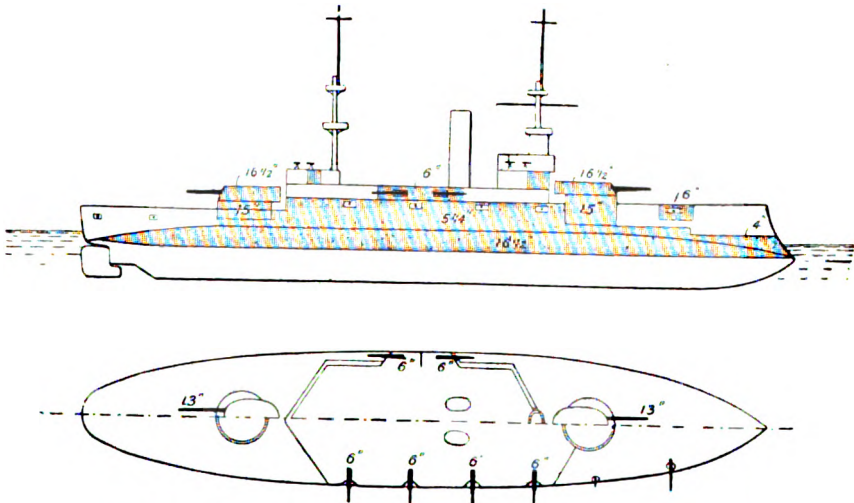
UNITED STATES.

BATTLESHIPS.

Alabama.

Illinois.

Wisconsin.

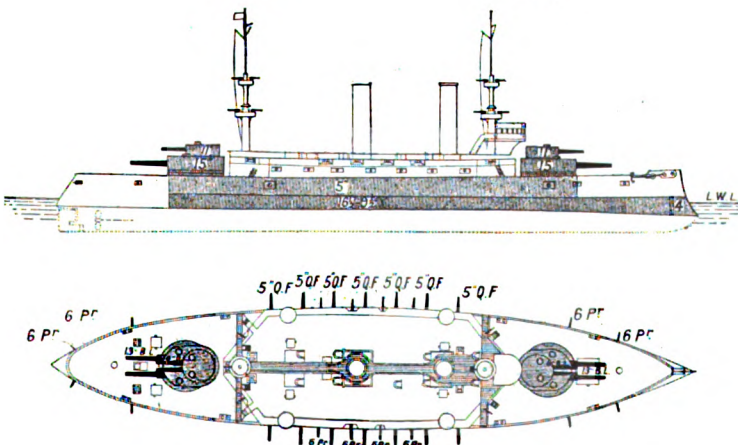


Length, 368 ft. ; 11,565—11,653 tons ; Speed, 17—17.45 knots ; Completed, 1900—1901 ;
Armament, 4—13 in., 14—6 in., 16—6 pr.

See page 217.

Kearsage.

Kentucky.



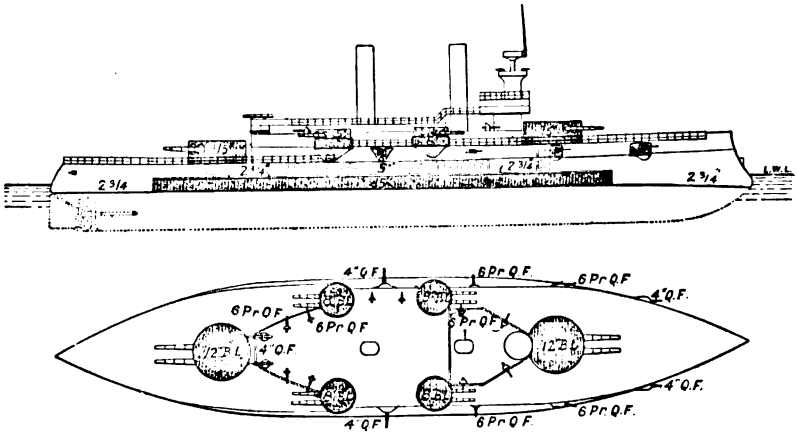
Length, 368 ft. ; 11,540 tons ; Speed, 16.8 knots ; Completed, 1900 ;
Armament, 4—13 in., 4—8 in., 14—5 in., 20—6 pr.

See page 218.

UNITED STATES.

BATTLESHIP.

Iowa.



Length, 360 ft. ; 11,340 tons ; Speed, 17.1 knots ; Completed, 1897
Armament, 4—12 in., 8—8 in., 6—4 in., 20—6 pr.

See page 217.

UNITED STATES.

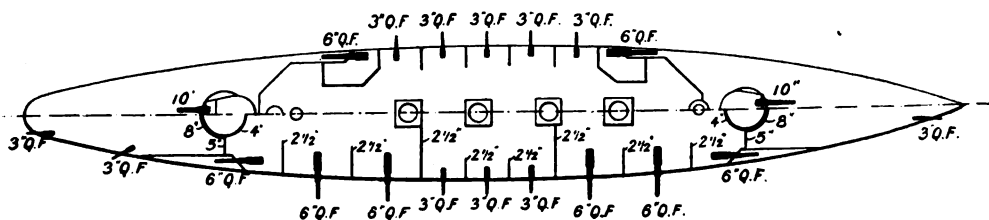
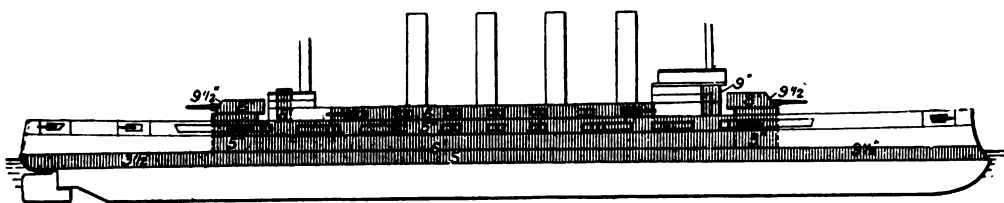
ARMoured CRUISERS.

Montana.

North Carolina.

Tennessee.

Washington.



Length, 502 ft. ; 14,500 tons ; Speed, 22—22.8 knots ; Completed, 1906-1908 ;
Armament, 4—10 in., 16—6 in., 22—3 in., 12—3 pr.

See page 218

California.

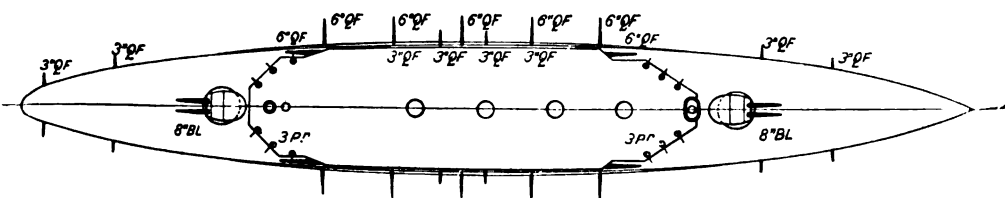
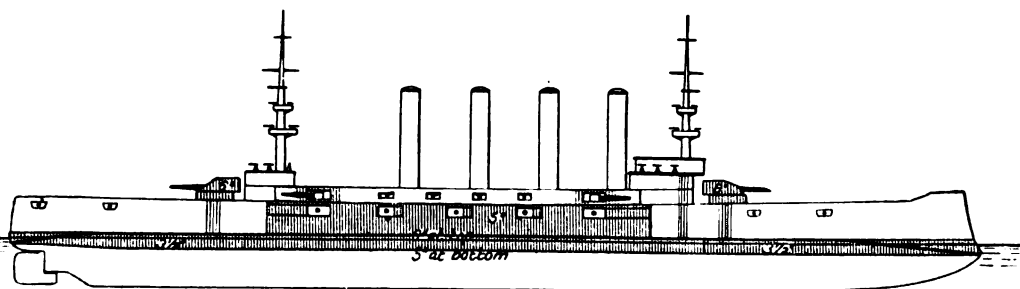
Colorado.

Maryland.

Pennsylvania.

South Dakota.

West Virginia.



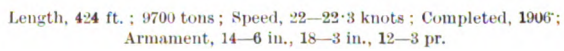
Length, 502 ft. ; 13,680 tons ; Speed, 22—22.4 knots ; Completed, 1905-1907 ;
Armament 4—8 in., 14—6 in., 18—3 in., 12—3 pr.

See page 217.

PLATE 63.

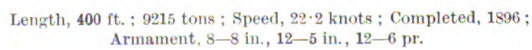
ARMoured CRUISERS.

St. Louis.



See page 217.

W.L.



See page 217.

PART III.

ARMOUR AND ORDNANCE.

PART III.

ARMOUR AND ORDNANCE.

GUNNERY PROGRESS.

LAST year, when this section was restored to the *Naval Annual*, the increasing difficulty of reviewing adequately the progress made in the production and development of armour and ordnance was briefly referred to. The enforced reticence of the manufacturers, both in regard to their own private trials and those made for the Government, has not abated in the least. No information can be given without the express permission of the Admiralty and War Office, and this has proved as a rule most difficult to obtain. The interests of the nation very properly stand first with all concerned, and it may be said that as it is with our own authorities, so it is with those of foreign Powers; the same atmosphere of secrecy envelopes all that is done abroad as that which enshrouds similar matters at home.

Scope and necessary limitations of the treatment of these subjects.

In view of this state of things, it has been deemed expedient to extend still further and enlarge the scope and purpose of this section, and to regard, indeed, everything within the whole field of the attack and defence in naval warfare as relevant to the subject matter of its pages. It will be found, therefore, that the information dealt with falls naturally within three categories. First, that which relates to the use of the manufactured material, or, in other words, the battle exercises of commissioned ships; recent changes in equipment, or those proposed; and the questions which have arisen for discussion in connection therewith. The importance of these matters cannot be gainsaid, nor their direct connection with further improvements in the scientific appliances of war, and the efforts of inventors in this direction. In the next place, there are details of home manufacture and supply, the installation of new plant and the production of new designs, with other matters tending to increase and augment our sources for the provision of war material. If there is no striking advance to record, the data given on page 273 with regard to trials of corrugated Era armour—the first public reference, it is believed, to the subject—give promise of a notable development which may have

far-reaching results. Lastly, there is grouped together some information about the resources of foreign countries for the production of armour and armament, with particulars of some recent trials, and the introduction of new appliances and machinery. Here also will be found a comparison of British and American methods which should prove of interest to naval men. Although, then, there must not be expected that purely technical treatment of the subject which was possible when the compiler of this section had greater facilities for gaining information, it is hoped that it may still be found to possess a definite value to all students of naval progress.

The new
British
guns.

The general trend of advance in the equipment of British ships of war is sufficiently indicated in the official statements to which reference was made last year. It was then stated that, as regards the guns, an improved design, the 12-in. of 50 calibres, had been accepted, and was to form the principal armament of the new battleships. Although there have been rumours about the discovery of defects in this new Mark XI gun, there is authority for stating that at the range and accuracy trials the gun has been proved most satisfactory, and has shown improved ballistics upon the earlier designs. This gun is to form the principal armament of the new vessels of the St. Vincent class, but has not yet been mounted in any completed ship. It has a muzzle velocity of over 3000 f.s., and a penetration of 17 in. of Krupp armour at 3000 yards, with a projectile of 850 lb. A still heavier gun, a 13·5-in., firing a 1250 lb. projectile, is reported to be under trial and to have given increased results both as regards range and penetrative power. The growth of heavy guns in all countries is very marked. Although a preference is still shown in Germany for the 11-in. gun, there are indications of an intention to use a heavier piece in the future, possibly the new Krupp 12-in., firing a projectile of 981 lb. Similarly, in the United States and in France, there has been considerable discussion upon the subject.

A German
view.

But it is particularly the British system of manufacture or construction that is criticised abroad. In the German Annual, *Jahrbuch für Deutschlands Seeinteressen*, "Nauticus," the editor, while acknowledging that the penetrative power of a 13·5-in. 45-calibre gun is 12 per cent. greater than that of the 12-in. 45-calibre, argues that this advantage insufficiently compensates for the increase in weight of the piece. He asserts also that, owing to the increased length, the heavier guns will have a shorter effective life, and recalls the defects which developed in the old 110-ton guns. He sums up his indictment thus: "As the British wire-tube guns of 45 calibres are reported to have insufficient longitudinal strength, and to deflect at

the muzzle, the characteristic defect of British naval artillery,"the 50-calibre guns would logically possess that defect to a much greater extent."

That these views are not shared by the British Ordnance Committee and the gun manufacturers is shown by the fact that the policy of this country in regard to gun design remains unchanged. The wire gun, it is held, has great advantages in circumferential strength and lends itself to a system which enables a gun to be repaired with an inner tube over and over again. In combination with solid steel tubes and outer coverings it can be made thoroughly stiff longitudinally, *i.e.*, as a cantilever. The system has been criticised unjustly because in one or two designs it has been carried too far, to the prejudice of stiffness. In the earlier design of the 12-in. Mark XI gun a mistake was made in not continuing the wiring to the muzzle, and at the trial some want of girder strength became manifest. The mistake was corrected by removing the thick outer tube over the chase, continuing the wiring to the muzzle, and then placing a thin outer tube over the wire. As already stated, this change has proved entirely successful, and it is not at all likely that we shall abandon the system.

The disposition of the heavier battery of the battleships, the question of duality of calibre, and the need for strengthening the anti-torpedo armament, are other matters which still engage the attention of Continental critics. Foreign views upon these vexed questions will be dealt with presently, but it must be said that there is far less unsettlement of opinion in this country upon the subject. In regard to the anti-torpedo armament, it has been officially admitted that further progress is necessary, and we have advanced from the 12-pr. to the 4-in. gun. There has been some talk of 4·7-in. guns being mounted in the Neptune, presumably of new pattern. Official information on the subject is scanty, but it has been announced that the improved 4-in. high velocity gun which has been introduced has proved very satisfactory, and is reported to have given better results than the old 4·7-in., or any foreign gun of similar calibre. It has the high muzzle velocity of 3000 f.s., and a penetration of about 5 in. of Krupp steel at a range of 3000 yards. The whole question of the disposition and protection of the torpedo defence armament is under consideration. These guns, of whatever calibre, are primarily intended for night use against torpedo attack, and it is generally admitted that such attack would, in the majority of cases, follow an engagement by day. If, therefore, the torpedo defence guns have been exposed during the day action, it may be assumed that many of them would be disabled and would be unfit

Anti-torpedo armament.

for use when wanted. In the United States, the question was raised by Commander Key in his report upon the design of the North Dakota. He said: "In connection with the subject of providing well protected and high positions for the torpedo defence guns of the most recent type of battleship, it is suggested that it may be practicable to use the tops of the main turrets for this purpose. It may be feasible to design the main turrets so that a pair of torpedo defence guns can be pocketed in trenches in the tops of the turrets, a small block of armour hinged to the turret to close the forward end of the trench over the chase of the gun, so that only the muzzle and a portion of the chase would be exposed to the fire of the enemy on the engaged side. It would be necessary to equip such guns with mounts that would permit their being quickly raised to their firing position, and the mounts should permit them to be trained independently of the turrets. The ammunition for such guns could be supplied through the main turrets without interference with the 12-in. guns, as they will not be fired at the same time." This suggestion was not adopted, although it was admitted that the position and protection of the torpedo defence battery were indefensible. The defect exists in all British men-of-war also, and, in fact, that the whole matter relating to the matter of defence against torpedo attack needs attention is generally recognised. It seems possible that if the guns used for this purpose are not too heavy, they might be kept below armour during daylight, and brought up and mounted when needed. It will be seen later that a French proposal recently put forward would provide for such an arrangement.

The
Hard-
castle
torpedo.

Connected with the same subject is the further advance which has been made in developing the range and speed of the torpedo, with the disposition and use of searchlights. In the last issue of the *Naval Annual* the good progress made, and the satisfactory results obtained, with the Whitehead, fitted with the super-heating arrangement designed by Messrs. Armstrong, Whitworth & Co., were described. Now we have to record the still better results reported to have been obtained with the torpedo invented by Engineer-Lieutenant Hardcastle. This torpedo, with a diameter of 21 in. and a bursting charge of 200 lb., is said to have a speed of 31 knots, and an effective range of 7000 yards. The speed of the 18-in. Whitehead fitted with a super-heater was 28 knots for a range of 5000 yards, so that if the reported achievements of the Hardcastle torpedo are correct it covers its range of 7000 yards in as near as possible the same time that the older torpedo takes to cover the shorter distance.

This improvement in the torpedo cannot fail to be a potent factor

in the problem of torpedo attack and defence, but it must also have its effect upon daylight engagements between battleships, since vessels are not likely willingly to come within the range of the torpedo while their speed and guns enable them to remain outside that range and to effectively damage the enemy.

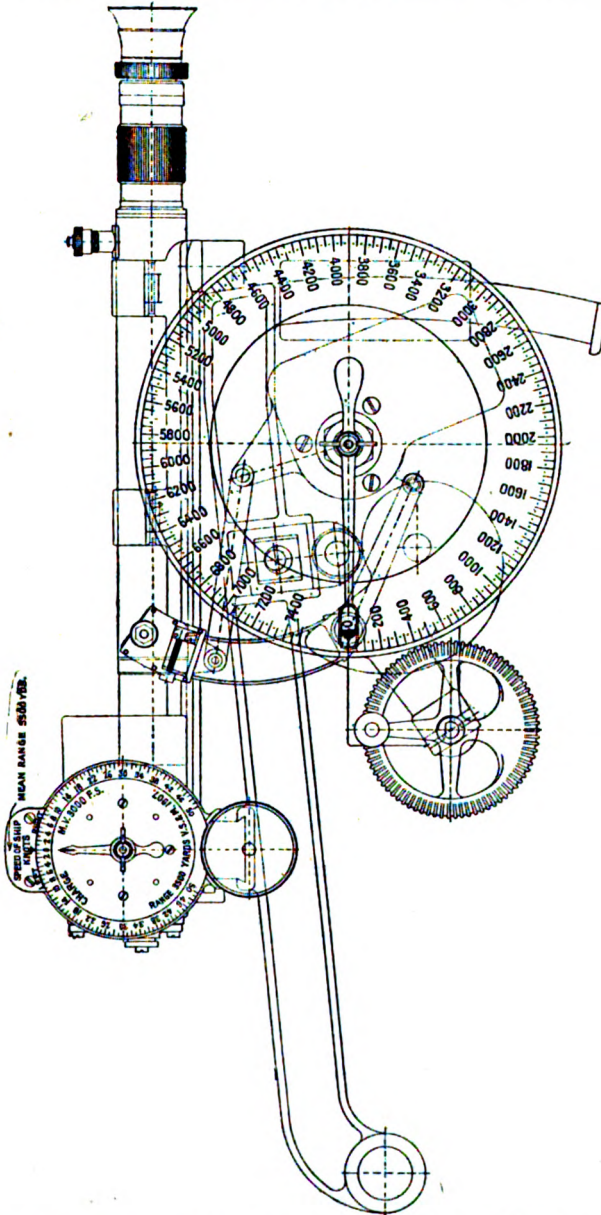
In connection with this phase of the matter we may turn to the reports of the gunnery practices for last year which have been published by the Admiralty. The marksmanship and good shooting of the Fleet continue to show an improvement, although since this subject was dealt with in the *Naval Annual* for 1906 the conditions under which the practice is carried out have considerably altered. In the case of the gunlayers' test, a much smaller target has been used for the last two years, yet the results, as will be seen by the tables which are given in Part IV., continue to exhibit a marked advance in marksmanship. But it is with the battle practice of the Fleet that we are more concerned, as this has only been made possible by the installation of electric instruments, range-finders, and other accessories for fire control. The importance of assimilating as much as possible the conditions under which this exercise is carried out to those that will obtain in war time have been fully recognised by the authorities. The target, which in the practice for 1907 was fixed, was in 1908 towed at an unknown speed, course, and range. The target itself is as large as a small ship, the base measuring 141 ft. in length and 5 ft. in breadth, with a proportionate draught. Upon this floating structure the actual target of lattice work covered with canvas, 90 ft. long by 30 ft. high, is built up. All the big battleships of the Dreadnought class measure at the water line between five and six times this length, and are as high or higher out of the water; so that, although when carrying out her battle practice in rough weather and blowing hard, the *Good Hope* put no more than 22 hits out of 144 rounds upon the target, the error being a lateral one, every one of these shots would have told on the hull of a Dreadnought. Again, the circumstance that the *Indomitable*, firing at a similar target with her 12-in. Mark X guns, should make 18 hits out of 32 shots, at a range of over 8000 yards, is due not only to the better training of the officers and men but to the great improvement which has been made in the material. The capacity of the gunlayer to point his gun and keep his sights on the movements of an object at these long ranges as easily as a sportsman can use his fowling piece is due to the advance made in the working mechanism giving greater control over the guns, and to the better sighting appliances, upon which the final accuracy so largely rests.

Gunnery
practice.

FIRE-CONTROL POSITIONS, SIGHTS AND RANGE-FINDERS.

Experiments are being continually carried out for the purpose of improving the existing methods of directing gun-fire, both by day and night. Success in the engagements of the future will depend upon accurately measuring and anticipating the distances of approaching hostile ships, and therefore making the most efficient shooting at the longest ranges. The instruments necessary for this purpose must have the most delicate accuracy, and it is satisfactory to know that the range-finders and other appliances with which the ships of the Fleet are supplied are of the most modern type. Many interesting questions have arisen with regard to the control position and the protection of the instruments connected with it. These latter, it may be taken for granted, will be placed behind armour, but the control officer must necessarily remain exposed; and while in this country we have hitherto been contented with the tripod mast of the Dreadnought, the Americans have introduced and supplied to two of their ships a novel form of openwork mast, constructed entirely of steel tubing, upon which the control position is placed. A test was made of this type of mast in May, 1908, when it was found that although the shots fired caused a certain amount of injury to the wirework, they failed to destroy its stability. Advantages are claimed for it in this respect, in the matter of weight, and also that it offers a more difficult target to the enemy. In regard to the sights, the Japanese are said to have adopted a Ross 5-21 power telescope, while other improvements have been introduced, tending to assist the gunlayer in keeping his piece upon the target. In the *Naval Annual* for last year we illustrated and described the "Follow-the-Pointer sight" of Messrs. Vickers, Sons & Maxim, and we are now able to show a further development of this system, consisting of a combined range indicator and transmitter by which the same idea of saving time is carried out as in the "Follow-the-Pointer"; but instead of having two separate instruments, with a man attending to each, and calling the range from one to the other, it is combined in one instrument, and the handle for working the transmitter switch is so arranged by gearing as to actuate a pointer, and in transmitting ranges all the man has to do is to turn his handle so that the pointer follows the range-indicating pointer. The instrument has the further advantage that any spotting correction can be added to the transmitter by an independent handle, without in any way affecting the following of the various ranges indicated, so that the sight is receiving it almost instantaneously with the range-indicator itself. As this indicator moves at a uniform rate for whatever speed it is set, the

graduations on the indicator are equal, therefore the graduations on the sight-dial, or the movements of the pointer, are equal for all ranges, and to give the sight the necessary varying elevation a cam is provided.



VICKERS ELECTRIC "FOLLOW THE POINTER" SIGHT
WITH CALIBRATION AND CAM ELEVATING GEAR.

In this system the guns are provided with the "Follow-the-Pointer" sight, with cam elevating gear, which is controlled by means of a range-indicator and transmitter. The range-indicator and

Vickers' combined range-indicator and transmitter.

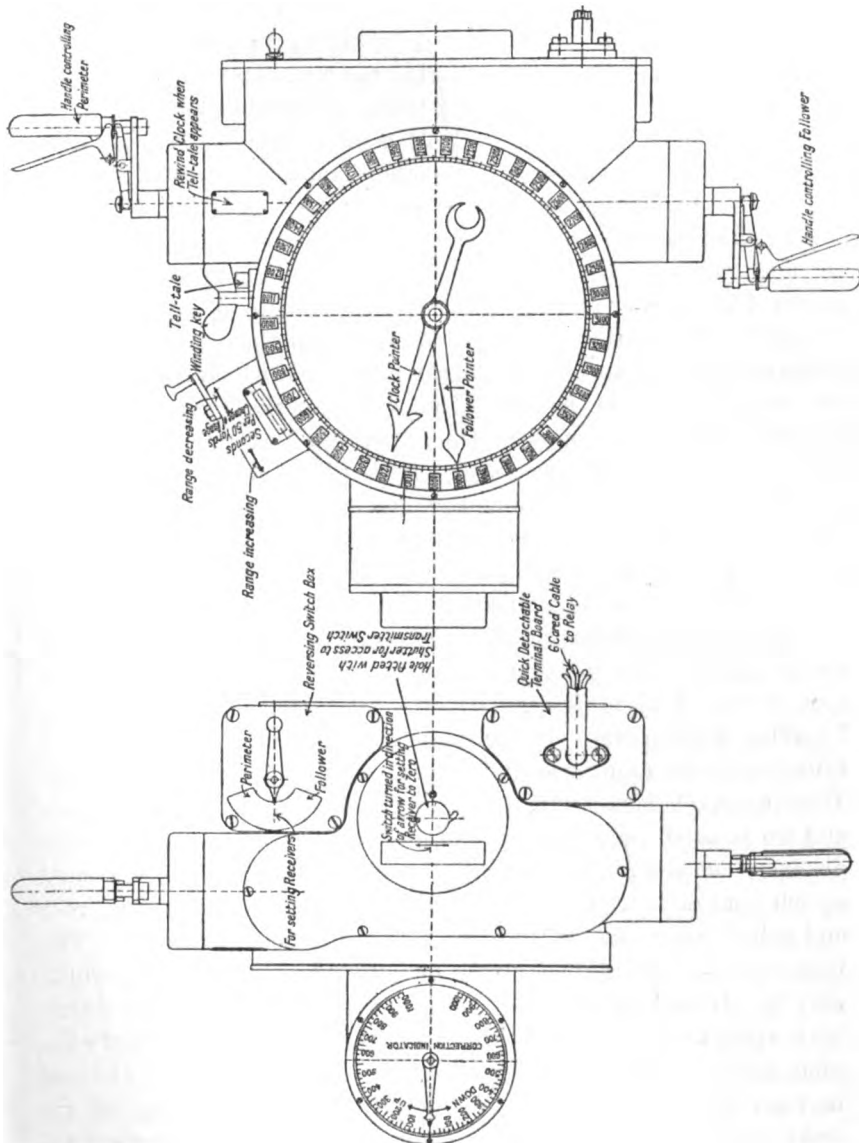
transmitter is provided with a pointer actuated by clockwork, which may be set to go at certain constant speeds depending on the changing range of the target. Another pointer for following the clock-pointer is fitted, and is controlled by hand-gear, and the gear which controls this pointer also operates the transmitter switch. A spotting device is also provided; this is controlled by a handle on the right-hand side of the instrument, and the amount, either up or down, is indicated by means of the pointer on the correction dial. The sight, as arranged and adapted for use with the above instrument, is shown on pages 253-5. In place of the ordinary rack and pinion elevating gear, it is arranged to elevate the sight by means of a cam, the form of which is such that the revolution of the dials is in direct proportion to the increments of the range; with this arrangement all the divisions on the disc are equal at all the ranges allowed for. This sight is also provided with calibration gear for variations in temperature of charge and fall in velocity due to wear of gun.

In using the range-indicator and transmitter, the follower pointer may be standing at the zero or any other range, as also the receivers; but as soon as the range is found, say, 4000 yards, the handle on the left hand side is rotated until the follower pointer is brought round to the 4000 mark; by doing this it will transmit the same amount of range to the receivers. The clock pointer should now be brought directly over the follower pointer by means of setting the clockwork in motion in either direction at its fastest speed, then stop. The two pointers remain in this position so long as the given range remains constant.

But when an increase in the rate of change of range takes place, due to either the speed of the ship, the enemy, or both, which being first ascertained to be, say, 50 yards in ten seconds, by range-finder and timing, the scale cylinder is turned in a clockwise direction until the figure 10 comes under the cross-line on the window opening of the scale box. The clock is again started and the speed of pointer will now move at a corresponding rate. The following pointer should then be kept directly moving under the clock pointer by means of a handle on the left hand side, which at the same time rotates the transmitter switch and gives the change in range to the receivers at the guns.

After one or two rounds have been fired, the spotter may observe that the shot is falling either short of the object or too far away. If it is falling short, say, 150 yards, he at once gives the order for that amount to be put on the range, which is done by turning the handle on the right hand side and observing the movement of the pointer at the correction indicator dial, until it comes to the 150 mark. By

this movement it will have put on the range equal to that amount by having moved the perimeter round opposite to the pointers, also the same movement has rotated the transmitter switch and causes the extra range to be transmitted to the receivers or sight pointers;



VICKERS' FIRE CONTROL SYSTEM. Range Indicator and Transmitter (outside views).

this handle is now released and the other handle should be turned to keep the follower pointer under the clock pointer.

For the purpose of obtaining these results the works of a range indicator have been put into a casing together with the transmitter

The operation of the machine.

switch and the new gear for controlling the receivers. The transmitter switch may be operated by either of two handles, so arranged that only one may be in gear at once. One of these handles is geared to a pointer called the follower, lying under the clock pointer, the gearing being so arranged that one turn of the handle moves the follower a distance on the dial corresponding to 25 yards, and gives the switch a quarter turn, thus altering the range on the receivers by 25 yards. Thus, by turning this handle, the follower may be kept continually under the moving clock pointer, thereby keeping the receivers at the correct range. The other handle is geared to the dial in a similar manner, and is used for setting the dial, called the perimeter (which cannot be moved except by this handle), relatively to the clock pointer. It is also used for correcting the range indicated by the clock pointer in such cases as it is found to be too much or too little. The perimeter is geared up to another pointer, which indicates the exact amount of the correction, and which flies back to zero on releasing the handle. The works of the range clock are placed in the bottom of the casing, the handle for regulating the speed of the clock pointer being on the right hand side. On the same side is the clock winding key, and the tell-tale appears as a white square through the side above the winding key. The milled head for stopping and starting the clockwork is near the bottom of the case, opposite to the regulating handle, as shown on page 255.

The range and deflection dials are placed on the left hand side of the mounting. The sighting gear, which is of the cross connected type, is carried by supporting girder brackets which are secured to the sides of the cradle. The telescopes are of variable power, 5 to 12 illuminated for night use and 7 to 21 non-illuminated for day use. The telescope holders are pivoted into the rear end of the radial bars and are actuated by deflection gear secured to the bar at a suitable distance from the pivot. The radial bars are pivoted on bosses formed at the front ends of the supporting brackets, and carry at the rear end radial guide bars, which steady the sight during elevation. The bars are fitted with sliding blocks carrying hard steel rollers, which may be adjusted vertically by means of an eccentric. The rollers bear upon hard steel elevating cams, which are cut to exactly the same profile and are secured in similar positions on hexagons formed on the cross connecting rod. To prevent the rollers rising off the cams small check rollers are provided which run in grooves cut parallel with the edge of the cam. The elevating gearing is carried by the range dial casing secured on the left hand side of the supporting bracket. The elevating worm is secured to the dial and is actuated by a worm operated by a handwheel through bevel wheels. The

elevating worm wheel is connected to the cam shaft by suitable gearing, one of the gear wheels being made adjustable against backlash.

The movement to be given to the range dial is indicated by a pointer actuated through worm gearing by an electric motor, which is carried in a watertight oscillating box pivoted on a bearing formed on the back of the casing. The cable from the range indicator and transmitter is led into the box through a detachable terminal board, which may be removed by taking out four screws. On the back of the dial plate is cut a cam groove, in which runs a roller pivoted at the end of one arm of a bell-crank which swings in a bearing formed on the casing. To the quadrant arm of the bell-crank is fitted a sliding setting piece to which one end of a link is pivoted. The other end of the link is pivoted to the motor oscillating box. The quadrant is suitably graduated to indicate the position in which to fix the setting piece to give the necessary correction. To the face of the dial plate is secured an adjustable disc, which is marked with graduations equally spaced around the periphery. If the calibration setting piece is set at no calibration, the pointer will remain stationary, and the sight can be used in the ordinary way. When the motor operating the pointer is actuated by a current from the transmitter switch, it causes the pointer to move round to a position corresponding to the required range. The sight is now elevated until the index on the dial is brought opposite the pointer, the cam groove giving a certain motion to the bell crank. If the setting piece is set for no calibration, the motion of the bell-crank will have no effect on the motion of the pointer; but if the setting piece is set for calibration, the movement given to the bell-crank will be communicated by the link to the oscillating box, thus giving an additional movement to the pointer, the amount of this movement depending on the distance the link is fixed from the bell-crank pivot. The sight will have to be still further elevated to bring the index opposite the pointer, thus correcting the elevation for drop in muzzle velocity due to wear of gun and change in temperature of charge. The required deflection is indicated on the sight by a pointer which is rotated in front of the deflection dial through suitable gearing by a motor in electrical connection with the deflection transmitter, and which indicates the position to which an arrow engraved on the deflection dial has to be rotated to give the correct deflection to the sight. The motor is provided with detachable terminals, and is carried by a watertight casing.

ELECTRIC INSTALLATIONS.

In the First Lord's Memorandum accompanying the Navy Estimates two years ago, it was announced that electrically operated mountings for heavy guns had been worked out, and mountings of two different designs had been under trial. Since last year the *Invincible*, armoured cruiser, has made her gunnery trials, and these were particularly interesting owing to the fact that she is the only vessel in the Service having her 12-in. guns worked by electric power. In some of the older ships, carrying a pair of 6-in. guns on twin-mountings, and in some of the mounts of the 9·2-in. guns, certain operations were carried out by electric power, but in the *Invincible* all the operations connected with loading, training, and elevating are performed by electricity. An important matter in connection with the use of electricity for this purpose concerns the system employed for power transmission.

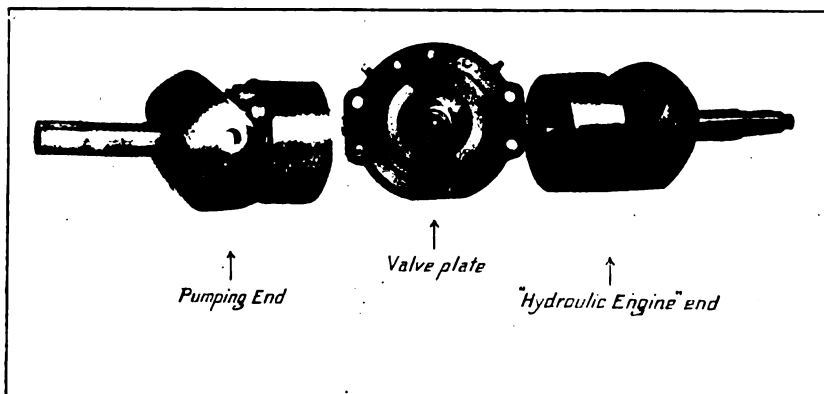
Universal
trans-
mission
machine.

During 1908 nearly all the leading Naval Powers who have electrically operated ships' turrets have been carrying out experiments and trials with the "Universal Transmission" machine, or, as it is generally called, "Williams-Janney controller," not only for elevating guns and turning turrets, but also for such work as capstans, hoists, steering engines, and for varying the speed or direction of the propeller shafts of internal combustion-engined picket-boats. The turrets and guns of over thirty American ships have been, or are being, fitted with these machines, and the following firms have secured ordnance rights under the patents for their various countries:—Messrs. Vickers in England, Messrs. Krupp in Germany, Messrs. Vickers-Terni in Italy, and the Skodawerke in Austria. Under these circumstances it is considered that a brief description will be of considerable interest to students of naval armaments.

The
machine
described.

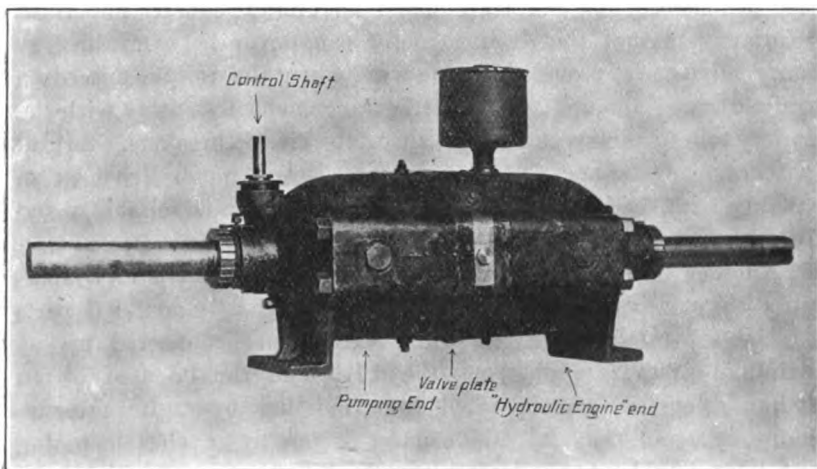
The Universal Transmission machine is a simple and compact device for transmitting rotary power at any desired speed between the maximum r.p.m. in one direction to the maximum r.p.m. in the reverse direction, of course passing through zero, notwithstanding that the source of power, usually an electric motor, is rotating at a constant speed and in one direction only. The machine consists of a barrel-shaped casing divided in the centre by a valve-plate, on one side of which is a pumping system, and on the other side is a multi-cylinder hydraulic engine, and for the sake of clearness in this description, the pumping end, which is connected to the electric motor, will be called the "A" end, and the motor end, which is connected to the elevating or turning gear, will be called the "B" end. Whilst the "A" end always rotates at the same speed, the amount

of oil pumped through the valve-plate can be varied from the full capacity of the pumping system down to nothing, when the "B" end of the machine comes at once to rest as the machine itself acts as a powerful brake. The manner of effecting the variation in volume



UNIVERSAL TRANSMISSION (open).

and direction will be understood from an examination of the accompanying photographs, from which it will be seen that on each side of the central portion or fixed valve-plate is arranged a cylinder barrel containing nine pistons which reciprocate in a direction



UNIVERSAL TRANSMISSION (closed).

parallel to the axes of the shafts. The pistons are connected by means of ball-ended rods to a socket-ring which is capable of rotation on a ball-race carried in a basin-shaped part which is prevented from rotation. The basin at the "A" end is capable of being inclined an

equal amount on each side of a plane normal to the shaft, whilst the corresponding basin of the "B" end is fixed at a permanent angle. The valve-plate is provided with two ports of a crescent shape, which extend through the plate and place the "A" and "B" cylinders in communication, so that when the "A" end shaft, socket-ring, and cylinder barrel are rotated, the pistons draw in oil from one of the valve-plate ports, and deliver it through the other; this causes the "B" end cylinder barrel and socket-ring to rotate at a speed proportionate to the amount of oil pumped by the "A" end, and in turn drives the "B" shaft through the Hooke's joint coupling which connects the shaft and socket. If the two basins are inclined to the same angle, the "B" shaft will rotate at the speed of the "A" shaft, but if the angle of the "A" socket-ring is reduced, the speed of the "B" end falls a corresponding amount. If the angle is reduced until the "A" socket-ring is perpendicular to the shaft, it is obvious that no reciprocation of the pistons is taking place, and no oil is being forced from the "A" to the "B" end, and the latter accordingly comes to rest. If the tilting of the socket-ring is continued, the "B" end will commence to rotate in the opposite direction at a speed proportionate to the angle of inclination. It will therefore be realised that as the number of speed changes is unlimited, the "B" shaft can have its speed or direction instantly altered or reversed without shock or jar. This is a most valuable feature when the machine is used to control guns and turrets, and an almost equally important peculiarity is that the driving motor can never be overloaded, as safety valves are provided to blow off when the torque exceeds a predetermined amount; this latter arrangement does away with the anxiety due to motor generators, rheostats, circuit breakers, overload switches or fuses, and almost puts the electric motor drive on an equality with the hydraulic engines so far as regards reliability and freedom from breakdown.

Another noteworthy characteristic of the machine is its adaptability to suit varying requirements, as the "A" and "B" parts can be separated to any required extent and connected up by hydraulic pressure piping, or the "B" end can be used as an hydraulic engine, and operated from existing hydraulic pressure mains, or, again, the "A" end can be driven by an electric motor, and deliver fluid into the hydraulic cylinder of an ammunition hoist or the elevating cylinder of a gun at any desired speed or direction, and can at the same time be used for braking purposes, or can be operated by automatic depression control gear. Recent independent tests of the Williams-Janney controller show a maximum over-all efficiency varying from 84 per cent. to 89 per cent.

MODERNIZED GUN-MOUNTINGS.

The older types of 12 in. gun mountings are being modernised, and the ships of which they form the armament are gradually being fitted with modern sights and elevating and training control gear. Where these alterations have been effected the increase in accuracy of fire is manifest, and it is necessary to take these matters into account in comparing results of the gunlayers' trials and battle practice. Although, however, improvements may be effected in this way, the guns remain the same, and it is only with newer types of ordnance that improvements can be effected in such matters as breech mechanism. In the *Naval Annual* last year the Holmstrom parallel obturator was illustrated and described, and we are now able to give descriptions of two of the latest breech mechanisms introduced by the Vickers firm as suitable for guns of 12-in. and 4-in. calibre.

The latest type of Vickers 12-in. mechanism, although similar in design to their well-known pattern, has several features which constitute a marked improvement on their previous breech mechanisms of heavy ordnance, see page 263. The principal features of this mechanism are already well known, but they may be briefly described as follows :—An interrupted and step breech screw is mounted on the spigot of a hinge carrier and engages by means of studs from the rear face with a lever plate mounted on the same spigot. This lever plate has a cam groove at the extremity of a long arm, with which engages the roller of a crank pivoted on a spindle in the interior of the carrier. The movement is imparted to this crank by hand or power through the medium of a worm, worm-wheel, hinge pin pinion, and intermediate spur and bevel wheel. The maximum power is obtained by means of the groove in the lever plate when seating or unseating the pad. Obturation is effected by means of a plastic pad protected by metal rings, seated in a cone formed at the rear of the powder chamber, and secured to the breech-screw by means of a mushroom-headed bolt and nuts, the former being pierced by an axial vent hole having formed at its rear end a chamber for the reception of the primer. On the rear of the vent bolt is mounted a box slide in which slide the electric and percussion locks, the latter being operated by the action of the breech mechanism.

Improved
Vickers
12-in.
breech
mechan-
ism.

The obturator is of an improved pattern of the above description, and has been put to such tests as have completely disarmed the criticism which has from time to time been directed against the cone system of pad obturation. Of course the advantages which accrue from an effective pad of this form are very obvious. All obturator

pads distend after a rapid firing series and cause difficulties to arise in opening and in closing the breech. A parallel pad is worst in this respect when opening, the cone pad when closing; but the cone pad, whilst presenting no difficulty in opening, has the advantage when closing that the maximum power requires to be exerted for a much shorter time, and the power is therefore very simply obtained. For example, with a distended coned pad, the obturator might come to rest at, say, .1 in. from home, and would permit of the maximum power being very simply applied, as in the case of the Vickers mechanism, by means of the grooved lever plate and the breech screw threads, whereas a similarly distended parallel pad would come to rest at least one inch from its final seating and would therefore present considerable difficulty in securing adequate mechanical power to seat it. The steep cone form of pad also permits a direct swing out without the necessity of withdrawal and consequently simplifies the gearing.

The latch retaining breech mechanism closed, a feature which is necessary in some form in all mechanisms of the heavy type, is of an improved design. It is claimed for it that it is certain in its action, simple in its construction, and ensures a perfectly even sequence of movement in operating the mechanism. The firing locks are of the separate electric and percussion type, but have been re-arranged with a view to additional facility in seating the primer and ease in assembling and dismantling. An improvement has been made by the addition of the retracting device which withdraws the striker prior to any lateral movement of the lock or rotary movement of the breech screw takes place when opening. In addition to the safety which accrues from this arrangement, it obviates any possibility of damaging the striker point. A pivoted link system for actuating the firing gear has been substituted for the cam groove and sliding bar method hitherto used and has added considerably to the efficiency of the gear. The movement in opening and closing the breech is very rapid, but at the same time is arranged to act very powerfully when seating or unseating the obturator pad. All the jar occurring when opening the mechanism is taken up by means of a hydraulic buffer which is placed in the carrier.

The breech mechanism is fitted with hand and power gearing, both of which act through the worm and the worm-wheel. The handwheel and power gear are stationary and secured to the mounting, the driving spindle moving with the gun, during recoil, through intermediary gear. Such an arrangement as this, of course, adds considerably to the safety of the man operating the mechanism. Roller and ball bearings are used wherever required to increase

successfully through very severe tests, both under the sustained pressure to which it has been subjected when acting as the breech mechanism for a closed vessel, and during the operation of slamming the mechanism against the breech by the hydraulic gear for upwards of 2000 times in uninterrupted series of 500.

Vickers' 4-in. breech mechanism.

The 4-in. breech mechanism is similar in principle to that just described for the 12-in., but is of a modified form suitable for this smaller type of ordnance. Instead of having a separate grooved lever plate a grooved arm is used in one piece with the breech screw. A crank mounted in the carrier engages with this grooved arm by means of a roller. The hand lever engages by means of bevel teeth with similar teeth on the crank, and by this means operates the mechanism. The locks and method of obturation are identical with that of the 12-in. breech mechanism, but the method of retracting the striker differs slightly in detail, although it embodies every element of safety similar to that just described. Departing from the usual practice adopted in this size of ordnance, a shot tray has been added which contributes considerable facility in loading the gun. The rapidity of fire has been greatly accelerated by these innovations, the 4-in. being capable of fifteen rounds per minute. These types of mechanism have now been applied to heavy and light ordnance respectively, of all calibres. A notable feature of the system is that the same firing gear is interchangeable with all sizes of ordnance from 4-in. to 12-in.

The Admiralty and naval ordnance design.

The Admiralty have now assumed complete control of, and responsibility for, all designs of naval ordnance and ordnance material, and have accordingly made arrangements for inspection and proof at contractors' works, which, up to 1st April last year, was in the hands of the War Office. Similarly, the contract arrangements in connection with the supply of naval ordnance and ordnance stores has been transferred to the Admiralty. This re-organisation of the administrative system should with other advantages result in uniform practice in inspection and tend to an increased study by naval officers of questions connected with the strength of materials, ballistics, and kindred matters of design and manufacture. The closer relations between the Naval Ordnance Department and the contractors should also lead to harmonious working.

Preliminary contracts for guns and gun-mountings.

Our gunmakers and armour-plate manufacturers are unfortunately not given the knowledge beforehand of what our shipbuilding programme will be. In this respect they are at a disadvantage with their German rivals. They are unable to make the preparations in advance which would ensure economical working. As Mr. McKenna says in his Statement for this year, "The estimated time for the com-

pletion of a battleship is now taken as two years ; but this period does not cover the whole time during which work is being done in obtaining necessary materials and in the manufacture of certain parts of the ship's equipment, such as gun-mountings. Three months' notice in advance ought to be given to contractors to ensure completion within two years from the date of the order of the hull, and if an exceptionally heavy demand were to be made on the contractors, much longer notice would be required." The cost of plant for manufacture of guns and armour-plate is very heavy, and there must be at the present time much of such plant standing idle for the greater part of the year, owing to the methods which find favour with the authorities. The matter is a national one, and it becomes a serious question if the specially trained bodies of men engaged on such plants are allowed to be dispersed for want of employment. There must always be the difficulty of getting them together again in an emergency, and the manufacture of armour-plate being an art, requiring the highest obtainable technical skill, it would appear reasonable that those engaged in it should be kept employed as far as possible. They recognise this fact in Germany, but it is not so in this country. Every now and again we are told that money spent upon war material is unproductive, but it is forgotten that the building of a battleship gives employment to nearly 9000 men for two years, and that out of every £100 expended on the vessel £70 goes in wages.

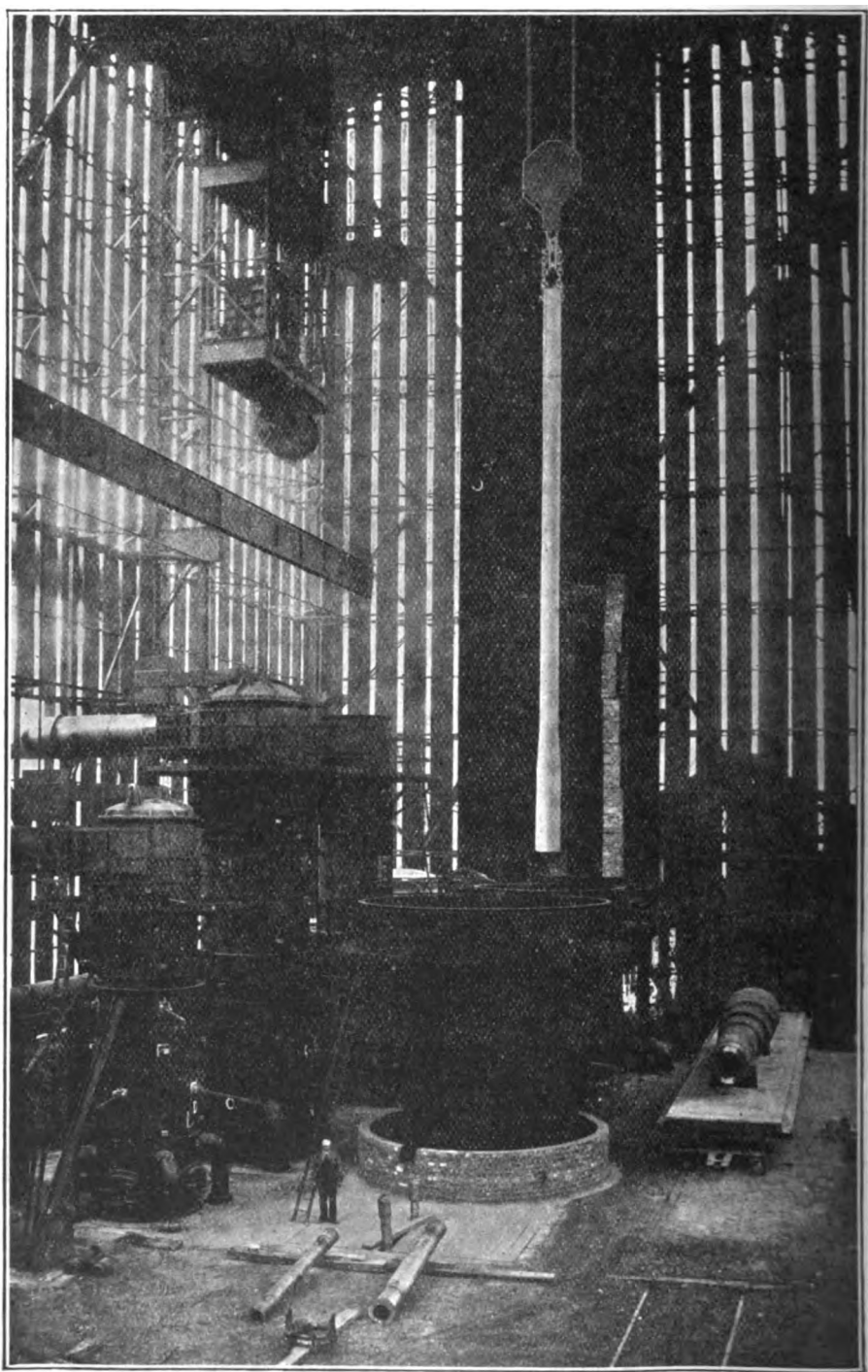
ARMOUR-PLATING, ETC.

There is not much to record in connection with the output of the various firms engaged in the work we have been considering. There has been little or no change in connection with the Krupp armour, and although several firms have had successful results under firing trials, the details are not available for publication. The Coventry Ordnance Works, Ltd., mentioned last year, have had their designs for 4-in. high velocity mountings, and also for 12-pr. mountings, adopted by the Admiralty, and these show an advance.

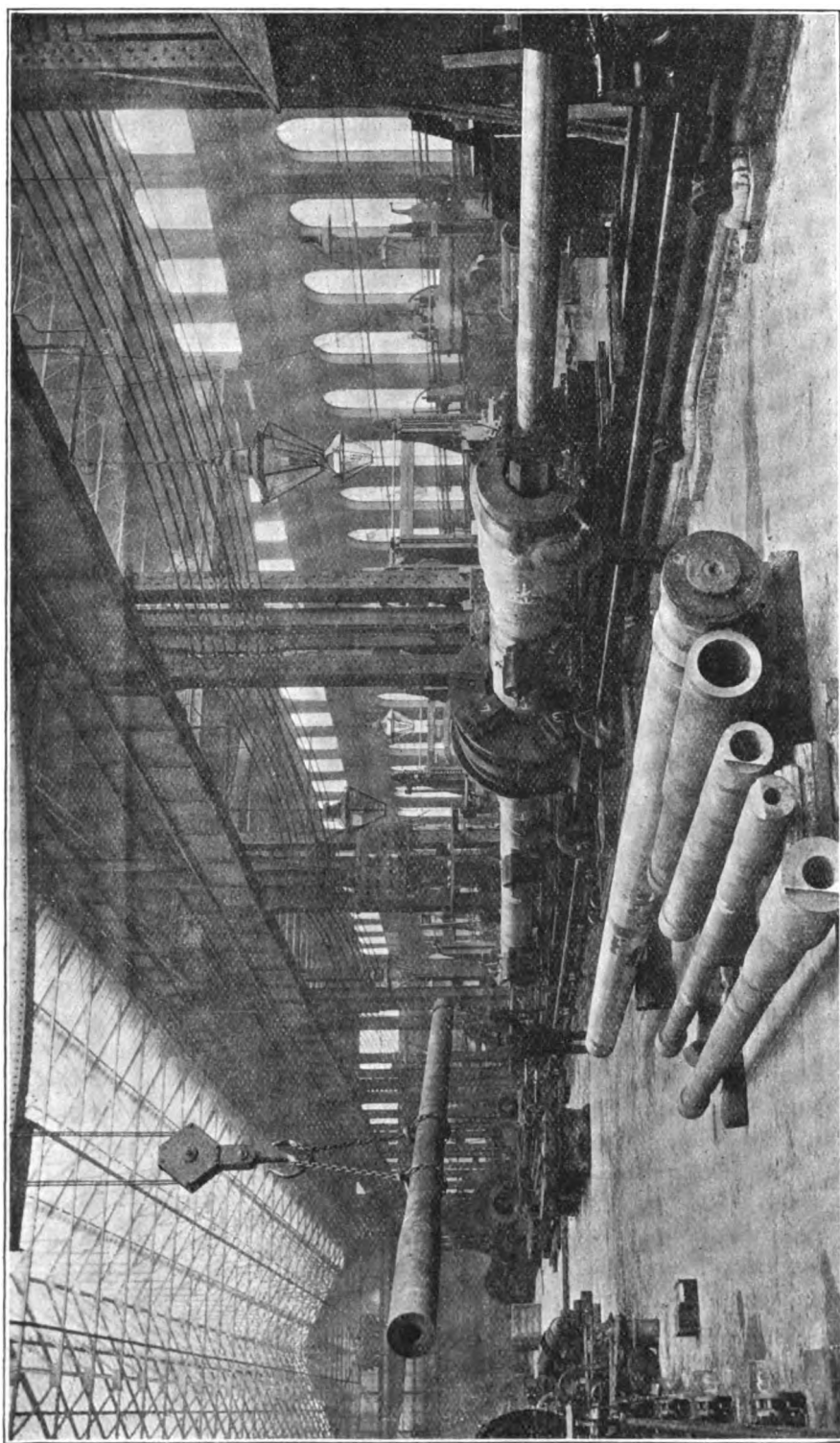
The armour plant at the Parkhead works of Messrs. W. Beardmore and Co. has been undergoing extensive alterations with a view to meeting the ever increasing demand for plates of greater superficial measurement. The firm have recently completed an order for 4½-in. plates, 13 ft. wide by 25 ft. long, which constitutes the maximum as to area required up to the present.

Beardmore's.

Considerable progress has been made in the manufacture of guns at Parkhead ; the capability of the new plant, both in machine shops



GUNTREATING SHOP, PARKHEAD.
(Oil Hardening and Tempering Tubes.)



GUN MACHINE SHOP, PARKHEAD. (Boring a 12-in. Gun Tube.)

and for the treatment of gun forgings, has been put to the test by actual manufacture; forging, hardening and tempering, machining, wire winding and rifling, have all been effected on 4-in. and 12-in. guns, and the efficiency of the plant thoroughly exemplified.

The photograph on page 266 shows the interior of the gun-treating shop, where at the end shown is the plant for oil-hardening and tempering the several tubes, jacket, etc., of guns. The tube shown suspended is for a 12-in. gun of 50 calibres; it has been heated in the tall vertical furnace shown open behind it, and is about to be dipped into the vertical oil-tank immediately below it; the depth of this tank is 70 ft. On the bogey to the right is a 12-in. jacket which is about to be placed in the horizontal tempering furnace, the door of which is seen behind it; to the left are seen other vertical furnaces for the different parts of the gun. At the other end of this shop, the height of which from floor to roof is 120 ft., are the shrinking pit and furnaces for building the gun up by tugging or shrinking on of tubes. The large hydraulic dipping crane—the cage and hydraulic ram of which are seen in the left upper portion of the photograph—is capable of dealing with a 100-ton gun, and travels at a height of 94 ft. above the floor.

Another photograph on page 267 shows one of the bays of the gun machine shops at Parkhead Gun Factory; in a boring machine is seen a 12-in. gun tube, some 54 ft. in length, being bored out ready for the insertion of the inner tube which is seen suspended; in the foreground are other tubes of guns in process of manufacture.

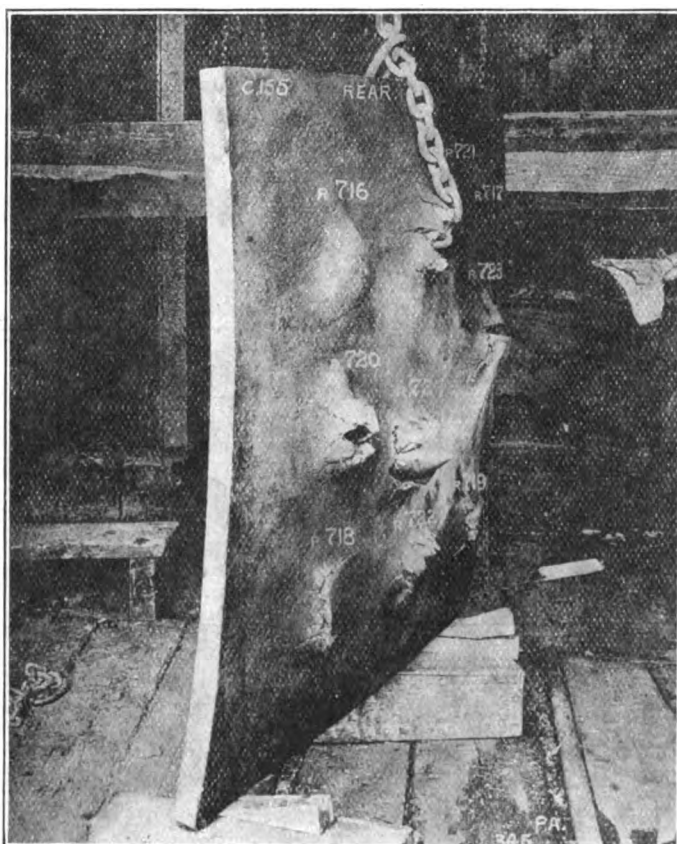
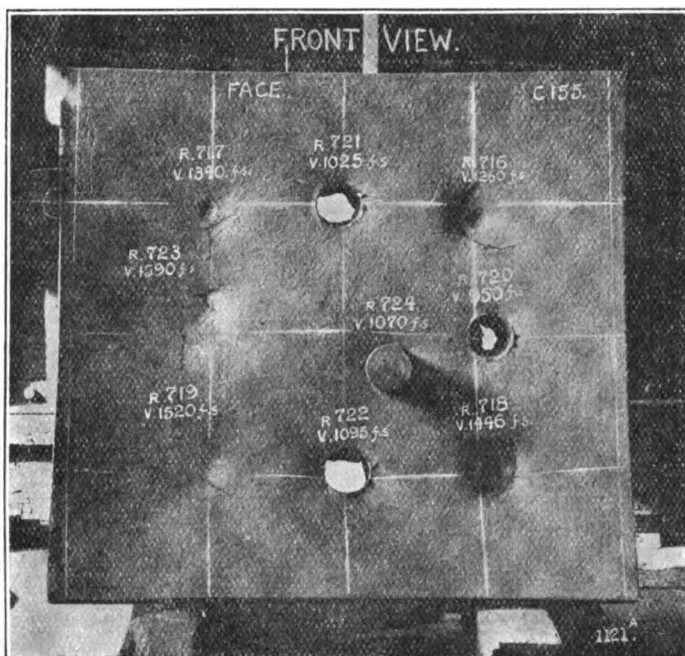
Dalmuir.

The manufacture of gun mountings has been commenced at the Dalmuir Works, where, in the course of time, it is intended to instal an additional plant for the manufacture of every class of gun-mounting from the heaviest turret, hydraulic worked, mounting to the smallest, hand worked.

Hadfield
plates,
"Era"
steel and
"Heclon"
pro-
jectiles.

The Hadfield "Era" steel has made further important developments since we wrote about it last year. Owing to its important and increasing use, Messrs. Beardmore have taken out a license from Messrs. Hadfield to use the Hadfield system and patents for the manufacture of "Era" steel, with or without hard face, in its various applications for naval and military purposes.

As an example of the excellent manner in which these plates stand the attack of projectiles, the following information with respect to rounds fired at a 2-in. "Era" steel plate made under the Hadfield system, possesses special interest. This plate only weighed $12\frac{1}{2}$ cwt., and withstood a striking energy equal to 5100 ft. tons per ton of plate. The attack was specially severe because the plate was of a thickness equivalent to only half the calibre of the projectile used; in other



2-IN. "ERA" STEEL PLATE ATTACKED WITH 4½-IN. PROJECTILES.

words, the attack was "sub-calibre" nature. The projectiles were $10\frac{1}{2}$ c.m. ($4\frac{1}{8}$ ins.) calibre (see page 269). The accompanying table gives the summary of the attack on this 2-in. "Era" plate.

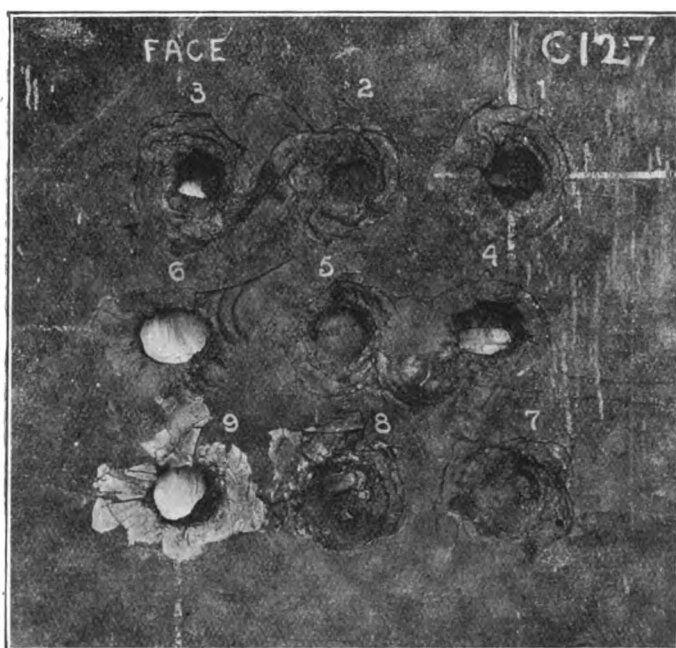
Round No.	Type of Shell.	S.V.	F.P.	Result.
716	Common Shell	1260	2·33	Broke up on face
717	" "	1340	2·55	" "
718	" "	1446	2·86	" "
719	" "	1520	3·07	" "
720	"Heclon" A.P. Uncapped. .	950	1·50	Rebounded, whole
721	" "	1025	1·70	" "
722	" "	1095	1·88	Through, unbroken
723	Common Shell	1590	3·29	Broke up on face
724	"Heclon" A.P. Capped ($32\frac{1}{2}$ lbs.)	1070	1·83	Stuck in plate

The plate was backed with 9 ins. of oak and $\frac{1}{2}$ -in. skin plate for all rounds except No. 716. Rounds Nos. 716–719 and No. 723 were with common shell; rounds Nos. 720, 721, and 722 were with armour-piercing uncapped "Heclon" shell, and round No. 724 was with standard capped armour-piercing shell, "Heclon" type. The last is specially interesting as showing that a capped projectile fired with the same F.P. as an uncapped is at a disadvantage against a thin half-calibre plate of "Era" steel. Similar rounds fired against 2-in. hard-faced plates with capped projectiles got completely through, whereas, in the cases above-mentioned, they did not perforate the "Era" steel.

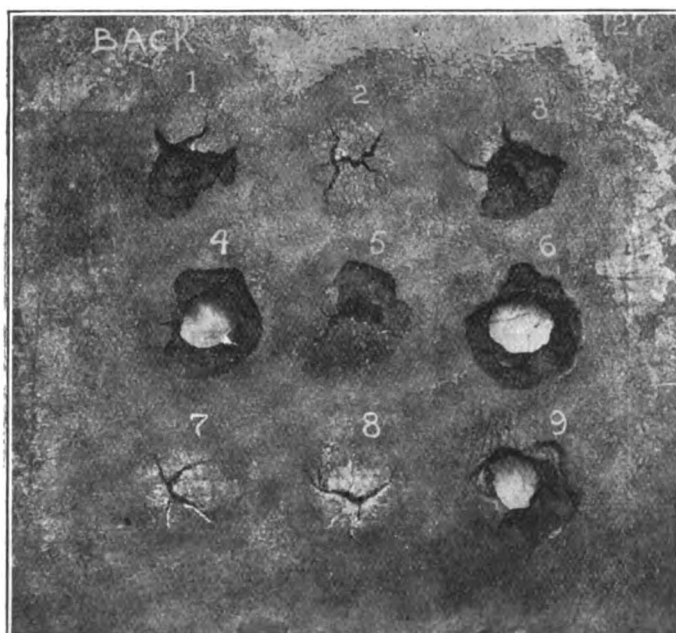
As regards the Hadfield "Era" armour with hard face, the results of a number of tests are shown by the photographs reproduced on page 271, and the following table:—

Round No.	Projectile.	S.V. f.s.	F.P.	Energy. ft. tons.	Result.
547	"Heclon" capped	1940	2·13	850	Penetration $3\frac{3}{8}$ ins.
548	" "	1975	2·15	880	Penetration $3\frac{1}{8}$ ins.
549	" "	2060	2·27	907	Penetration $5\frac{1}{8}$ ins.
553	" "	1980	2·16	885	$1\frac{3}{8}$ lbs., through
554	" "	2010	2·20	913	Not through. Point in plate
555	" "	1930	2·07	840	Part of projectile through
556	" "	1980	2·16	885	Penetration 3 ins.
557	" "	2000	2·19	903	Not through. Penetration about 4 ins.
558	" "	1980	2·16	883	Part of projectile through

This plate, $4\frac{1}{8}$ in. in thickness, was attacked with standard capped armour-piercing shell, Hadfield's "Heclon" type, $10\frac{1}{2}$ c.m. ($4\frac{1}{8}$ in.) calibre, weighing 33 lb., including cap, the plate being inclined 20° to the normal. With reference to "Era" hard-faced armour attacked

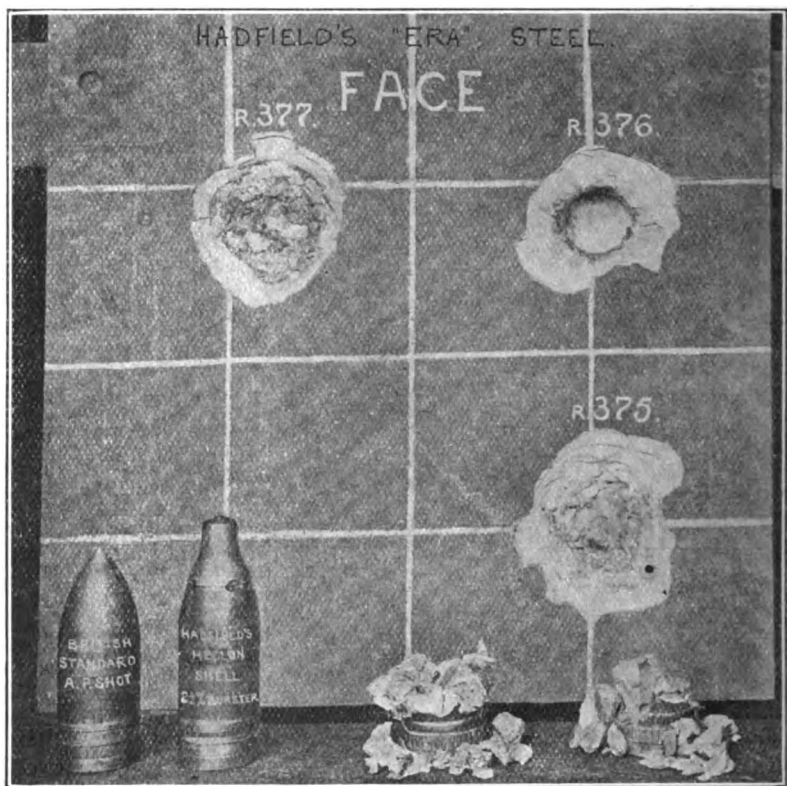


HADFIELD $4\frac{1}{8}$ -IN. "ERA" STEEL PLATE.
after attack with "Heclon" $4\frac{1}{8}$ -in. A.P. capped shell.



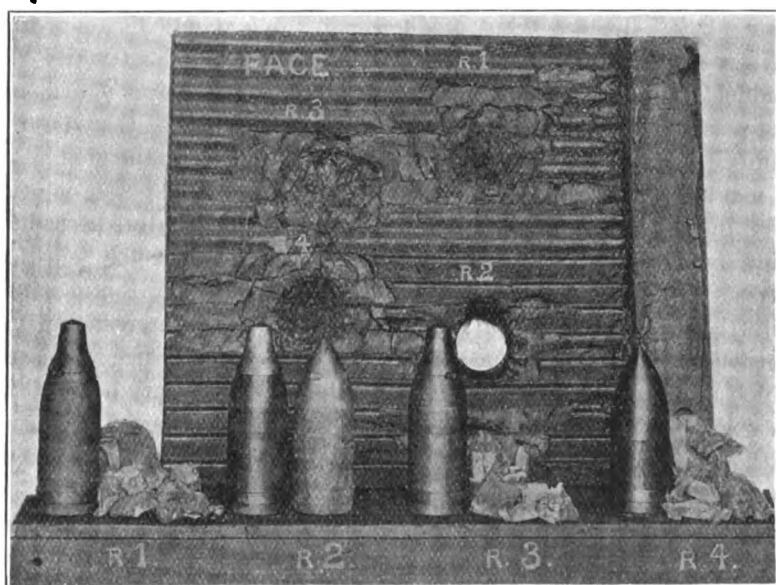
HADFIELD $4\frac{1}{8}$ -IN. "ERA" STEEL PLATE.
Back of plate.

normally, the following particulars represent tests: carried out on the 4-in. Hadfield plate, here shown:—



Round No. 375.—The plate was attacked by Hadfield's armour-piercing shot, uncapped, striking velocity 1880 f.s., F.P. 2·12, striking energy 760 ft. tons, equivalent to penetration of $8\frac{1}{2}$ in. wrought iron, or 3·5 in. K.C. Round No. 377.—Hadfield's armour-piercing shot, uncapped, striking velocity 1850 f.s., F.P. 2·06, striking energy 738 ft. tons, equivalent to penetration of $8\frac{1}{2}$ in. wrought iron, or 3·4 in. K.C. Round No. 376 shows results when attacked with Hadfield "Heclon" A.P. shell, capped, fired with a striking velocity of 1850 f.s., F.P. 2·06, striking energy 738 ft. tons, equivalent to penetration of $8\frac{1}{2}$ in. wrought iron, 3·4 in. K.C. The manner in which the shell has set up shows the good resistance offered to the standard A.P. projectile, notwithstanding the latter being capped. It will be noticed how exceedingly tough this "Era" steel is, as there are no surface, through, or back cracks; in fact, in these respects the plates show qualities equal to forged and rolled material.

The following reproduction of a photograph shows the results of some interesting tests of an "Era" plate, 3 ft. \times 3 ft. \times 4½ in. thick, representing one of Hadfield's latest developments in this kind of armour, the manufacture and form of which are covered by patents. The results obtained were encouraging. The Hadfield "Era" armour of this type appears to offer promise of a development of methods which will enable the attack of capped projectiles to be defeated. This is why it is called a "cap deflecting plate." Under certain conditions the particular form of the surface of this improved "Era" armour causes the cap to be displaced or deflected before it has time to give the necessary support to the projectile, as occurs in connection with the attack of ordinary armour having flat surface.



HADFIELD "CAP DEFLECTING" PLATE.

Round.	Projectile.	S.V. f.s.	F.P.
1	4½ ins. "Heclon" A.P. Shot. (Capped) .	1820	2·01
2	" " " " .	1837	2·04
3	" " " " .	1922	2·18
4	" " " (Uncapped).	2000	2·32

This table gives the velocity of the capped rounds. The calibre of the projectiles was 10½ c.m. (4½ in.), they weighed 31 lb. each uncapped. The upper portion of the plate was of special corrugated

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form, and offered a much superior resistance. The lower portion also gave good results, as the uncapped round was fired at 2000 f.s. striking velocity. Judging from the result obtained, it would probably have kept out a shot at over 2100 f.s. As regards the capped results in the upper or corrugated portion of the plate, the penetrations obtained in rounds Nos. 1 and 2 seem to indicate that capped shot would be kept out at probably another 100 f.s. higher velocity—that is, about 1920 f.s. striking velocity. In order to compare the results, it should be borne in mind that if these rounds had been at an ordinary flat plate, perforation would have resulted at probably 1750 f.s.

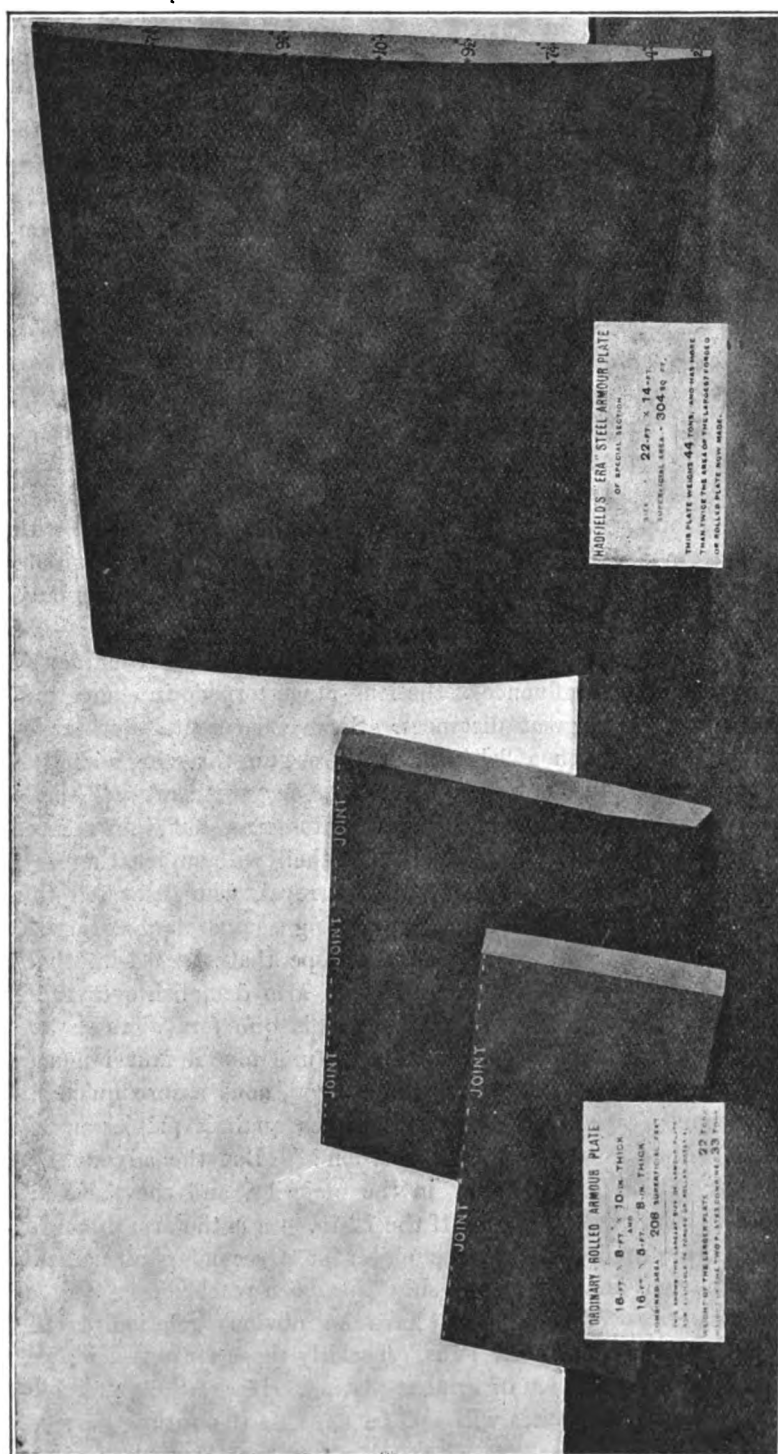
From the particulars of these trials and the accompanying illustrations, it would appear that “Era” steel is suitable not only for warship construction, but also for armour-plates. “Era” armour-plates have already been produced weighing about 25 tons, and having a length of about 14 ft. and a width of 9 ft. By the Hadfield system, and under their latest patents, the sizes of armour-plates can be made larger than otherwise possible—that is, the number of joints can be largely reduced. This opens up the possibility of making the broadside of a ship by forming it of plates in one tier only, instead of two as now. In other words, the central horizontal joint, with its unavoidable weakness, would then be entirely dispensed with. This matter of doing away with horizontal joints, with their inevitable weakness, should be of special interest to naval constructors. The difference between ordinary rolled armour-plates, which must have horizontal joints to obtain the necessary height, and an “Era” armour-plate of special section and varying in thickness, without a horizontal joint, is well shown in the photograph reproduced on page 275.

The use of “Era” steel for land turrets, used in coast-defence guns of large calibre and other similar purposes, should be very important. Compared with chilled iron or very expensive forged or rolled plates, “Era” steel can be supplied of less weight than the former, and at the same time offer much better protection; as compared with the latter, its price is much lower. The comparative resistance to penetration of armour-piercing projectiles of “Era” steel is very considerable, as shown by the accompanying tables and photographs.

FOREIGN PROGRESS.

Unsettled
opinion
abroad.

When we turn to the United States and the Continent, we find little trace of settled opinion on gunnery and ordnance matters. Abroad, as at home, the engagement of Tsushima set all those thinking who were concerned with these things, but the lessons were



ARMOUR PLATES IN FORGED OR ROLLED MATERIAL AND IN HADFIELD'S "ERA" STEEL.

interpreted in different ways. *Quot homines, tot sententiæ.* No one doubts that upon a correct reading of those lessons the wise expenditure of vast sums of money must depend. Some there were who believed that the days of the armour-piercing projectile were ended, and who looked for a revolution in the construction of warships as a consequence. The impression received from Captain Semenov's "Agony of a Battleship," confirmed by other information, had convinced them such must be the result. But the teaching of the war requires to be mastered with the coolest judgment, lest we suffer as we did by the misreading of the lessons of the American Civil War and of the battle of Lissa. The knowledge that the Russian ships at Tsushima were overwhelmed by the volume and intensity of the Japanese fire, and that armour-piercing shells had little influence on the result, led some to the easy conclusion that frequency of hitting rather than weight of shell was the object to be attained. If high-explosive shells should destroy everything above deck, and fill with fire and asphyxiating gases all below, what more could be required? It has even been contended that guns of medium calibre would have the desired effect.

Armour-piercing and high-explosive shells.

But such a view must ignore the consequence of the accuracy of heavy guns and the influence of the long-range torpedo in compelling fleets to engage at great distances. Some Continental authorities would be content with a 9·4-in. or a 10-in. gun, throwing a shell of large capacity, analogous to the *chemodani* or "portmanteau" shells of the Japanese, so nicknamed by the Russians, but vastly more powerful and greatly perfected. If this shell will suffice, they say, what is the use of the 12-in.? M. Pierreval, who discussed this matter in the *Moniteur de la Flotte*, arguing against large "torpedo shells" as impracticable, expressed the hope that the 9·4-in. shell, *qui perce tout à toutes les distances*, would also demolish everything behind the armour-plate perforated. "Mais que fera alors le 305 (12-in.) sur notre futur cuirassé? Encore une fois, il faut renoncer à comprendre. Sa seule présence, il est vrai, nous assure qu'en fin de compte on n'est autrement convaincu des qualités prêtées au 240 (9·4-in.). Mais est-ce là une consolation?" But the advocates of the larger calibre are probably in the majority, and they also are opposed to duality of calibre. If the 12-in. gun is the arm of power and effect required, what is the object of a secondary armament, whence the "all-one-calibre-gun ship" has been reached?

Matters to be dealt with.

Controversies of this kind have an obvious relation to the protection of ships and their guns, especially those for anti-destroyer use, and to the provision of armour-plating. If, say the extremists, armour-piercing projectiles will not be used in the future, may not

thinner plating be permissible? If the ship is to be covered by sheets of flame, must not the smallest armament be also protected? These controversies are mentioned to show that in foreign countries, more than in England, there is some unsettlement of opinion on the questions dealt with here. Not much information can be given concerning trials of armour-plate abroad, such trials now being conducted in conditions of the utmost secrecy. This, however, may be said, that progress is continuous, and that the armour-plate is still at long range unbeaten by the gun of calibre equal to its own thickness. Another point that may be suitably treated here is the endurance of guns, both in regard to erosion and to the system upon which they are constructed, but here again information is scanty, and some foreign gun-makers have an obvious interest in proclaiming the merits of guns built up on a system different from our own. The important subject of gun-mountings and arrangements for ammunition supply cannot escape attention in this part of the *Naval Annual*, and we have only to look across the Atlantic to see how designers and constructors in different countries endeavour to solve the same problem in different ways. What is now proposed is to take note of the ordnance and related questions that have arisen in the United States and on the Continent, and to give such information as may be available in regard to recent advances, and the resources that exist, as well as the claims that are put forward. There are questions of guns and gun-mountings, electric and hydraulic, the relative merits of wire-wound and built-up guns, the qualities of projectiles and armour-plates, and other matters to be touched upon.

UNITED STATES.

In the United States, the Bureau of Ordnance has charge of the manufacture of guns at the Washington Navy Yard, and conducts trials at the proving ground Indian Head. It is responsible for the design, construction, mounting and testing of guns, and of armour plate trials, as well as of systems of ammunition supply. Its chief, Rear-Admiral N. E. Mason, made in his last report an interesting proposal for the construction of ammunition vessels for the American Navy, saying the need of them had been amply demonstrated by the cruise of the Atlantic Fleet. Referring to the big guns of the ships now in hand, he remarked that substantial improvements had been made, and that a great increase of power was expected in the guns for the ships last authorised.

Ammu-
nition
vessels.

American
big guns.

Work has been begun on the 12-in. guns for the battleships *Florida* and *Utah*. The 12-in. guns for these ships are of a new mark, 45 calibres long, with a new design of powder chamber, and increased strength along the chase and at the muzzle. It

has been stated in the press and elsewhere that our latest types of 12-in. guns are inferior in power to those in use in certain foreign navies. As a matter of fact, the 12-in. guns mounted on the eight latest of our battleships already in commission are equal or superior in power to any 12-in. gun yet afloat anywhere in the world, and the 12-in. guns of our battleships in course of construction will be equal or superior in power to any 12-in. foreign gun of which we have authentic information Anticipating possible need of a more powerful gun, the Bureau early in the year completed the design of a 14-in. gun designed to fire a 1400 lb. projectile. The facilities of the Washington Navy Yard are not at present adequate to assemble a gun of this length, but an appropriation for raising the roof of the gun shop over the shrinking pit has been asked of Congress, and if it is made, and made immediately available, the Naval Gun Factory will be able to undertake the manufacture of such guns early in the coming year.

Turret-mountings in England and the United States.

To students of naval ordnance it has long been a mystery why the designs of English and American turret-mountings for heavy guns should offer so many points of difference. England, for example, has remained constant to hydraulic mountings, whilst America has for many years favoured electricity as the motive power; America has considered a straight through hoist from handling room to gun sufficiently safe and rapid, whilst England for the last ten years has had broken hoists and transfer arrangements in the working chamber; English mountings have had loading arrangements which permit of the guns being loaded at any angles of training and elevation, whilst America has been content with loading at all angles of training, but at a fixed angle of elevation. In a few words, English turret-mountings have for the last decade been in principle and in general design similar to the Vengeance type, introduced by Messrs. Vickers when they first took up the manufacture of heavy armaments. Improvements have been introduced from time to time, and the mountings strengthened to keep pace with the increase in length of the gun from 35 to 40 calibres, from 40 to 45 calibres, until to-day mountings are being made to take the new 50-calibre 12-in. gun. On the other hand, American mountings have remained of a type which can best be compared to the British Albion and Glory mountings, but operated electrically.

Electric mountings of the *Invincible*.

Since the last issue of the *Naval Annual*, however, there has been a change, and America has, in some respects, taken certain of the important features of English mountings, and England has had an opportunity of trying up-to-date 12-in. turrets electrically worked. To deal with the latter subject first, reference has been made above to the gunnery trials of the armoured cruiser *Invincible*, which took place at the end of 1908, but few details have been allowed to become public, and what small amount of information is available only serves to whet the curiosity and create a desire for further particulars. As is well known, the *Invincible* is a sister-ship to the *Inflexible* and *Indomitable*, but both the latter carry their guns on hydraulic mountings of the same type as those in the *Lord Nelson* and *Dread-*

nought classes. The *Invincible* has all four turrets electrically operated, and in order to give the two large English ordnance firms every opportunity of providing mountings representing the latest improvements, each firm was allowed to supply mountings entirely of their own design, the forward and after turrets being supplied by Messrs. Vickers, and the two wing turrets by Messrs. Armstrong, who also built the ship. It is generally believed that the gun trials were very satisfactory, and that the two types of mountings are equal, if not superior, in design and execution to those in any foreign battleship, and will, during the next year or two, enable the Admiralty to decide for the time being as to the relative advantages of electric and hydraulic gun machinery. In an electric turret-mounting the run out of the gun after recoil is effected by either a strong battery of springs or the employment of the pneumatic run-out cylinder and ram, and as one of the firms used springs and the other compressed air for the run out in their respective mountings, the Admiralty will be in a position to judge as to the relative advantages and disadvantages of both systems. It may be remarked in passing that the American ships are provided with spring run out, or, as it is called on the other side, "counter recoil."

As one of the ordnance firms fitted screw elevating gear, and the other installed worm-driven pinion and elevating rack, an interesting comparison will present itself. Both Messrs. Armstrong and Messrs. Vickers have their own systems of motor-generator control, both being variants of the Ward-Leonard system, which was so largely used in the United States Navy before the introduction of the Williams-Janney speed gear. Whilst the electric mountings of the *Invincible* may give every satisfaction in use, it is not considered probable that the experiment will be repeated for many years, as there does not seem to be an advantage over hydraulic mountings to warrant the change, especially as there is no feature about the service types of hydraulic mounting which is not perfectly familiar to officers and men, and who know, instinctively almost, the cause and remedy for any little idiosyncrasy which may develop from time to time.

Another feature which must militate against the introduction of electric turrets in the British service is the remarkable amount of safety apparatus required by the Naval authorities; and whilst the necessary interlocking and other gear can be readily applied to a hydraulic mounting without presenting weakness or complications, both drawbacks are almost necessarily present when applied to the switch gear and panels of an electric mounting. For some time to come it is expected that continual trials and experiments will be made with the electric mountings of the *Invincible*, and whatever

The Admiralty and hydraulic mountings.

may be the final verdict, the most bigoted enthusiast, be he electrophile or electrophobe, can have the utmost confidence in the judgment of the present Director of Naval Ordnance, who is equally at home with all sources of motive power—hydraulic, electric, pneumatic, and even internal combustion engines.

Anti-torpedo guns in England and the United States.

Many rumours were floating around during the past year to the effect that the Admiralty were not certain that the 4-in. 50-calibre gun was sufficiently powerful to be the only anti-torpedo gun of our newer battleships, and it was half expected that either a 4·7-in. or 5-in. gun might be substituted after the prevailing fashion in foreign ships; but at the time of writing it appears as if the 4-in. gun would last out, at any rate, for the new ships in this year's programme. A similar condition of affairs held in America, where there was much debating as to whether to retain the 5-in. anti-torpedo gun, or to replace it with a new 6-in. gun, and at the last moment it was decided to adopt the new 5-in. gun and mounting of the Bethlehem Steel Company. The principal novel feature of the gun is the Bethlehem Spiral Breech Screw, if it can be so called, as the threads have no pitch, and the slight advance movement required is obtained by the block engaging a screwed stalk on the carrier. The 5-in. gun has been adopted because it can be handled and fired more quickly. The report of the Bureau of Ordnance shows that it fires a 50 lb. projectile, and has a muzzle velocity of 3150 f.s. In the Japanese Satsuma the anti-torpedo gun is a 4·7-in.; in the Aki it is a 6-in.

To illustrate another point where English and American views diverge, it is only necessary to state that the English 4-in. gun takes bag cartridges and requires an obturator pad of the steep cone variety, while the Americans employ a brass cartridge case for their 5-in. gun. The mounting of this 5-in. gun is noteworthy as having a patent "two-handed" control for both the elevating and training numbers. This control is also used in the English 4-in. gun-mountings of the newer ships, and a short description will not be out of place.

Two-handed gun control.

The illustration shows the upper part of the elevating gear bracket, and it will be noticed that two hand wheels are keyed on to the same transverse shaft, having the hand grips arranged at an angle of 180°, and carrying on the right-hand grip a firing trigger, which completes the electric circuit by connecting two slip rings bedded in insulated recesses in the large circular bearing on the right-hand side. The Bethlehem Company claim, and produce evidence to show, that the shooting is improved very considerably by the use of this gear, and it will be obvious that the gunlayer has better control of his weapon

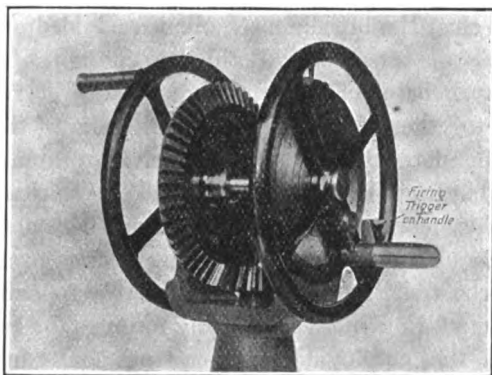
and by using both hands is better able to carry on continuous aiming without being unduly fatigued.

In all the new American ships the ammunition hoists will be of the two-stage type, differing in details for each class. The Bethlehem Company constructed a pattern of hoist for the Delaware, and three different types of hoist control and hoist motors were tested, the result showing that electrical manufacturers are able to comply with the latest requirements. An automatic ammunition-hoist controller, supplied for one of the 12-in. guns of the Missouri, has given such satisfaction as to warrant a recommendation that controllers of the pattern be fitted to all turret-hoist motors.

Two-stage
ammuni-
tion
hoists.

With reference to the question of safety in firing the Bureau of Ordnance has tested arrangements for air ducts and ejector attachments, and all guns are being fitted with efficient arrangements.

Pre-
venting
back-
flares.
Safety
arrange-
ments.



TWO-HAND ELEVATING GEAR, BETHLEHEM CO., U.S.A.

The system of using a closed turret, and keeping the turret chamber under a moderate air pressure, has been definitely approved as an auxiliary to the regular gas attachments. This is also a good means of ventilating turrets in action. The improvements are directed, not only to localising danger areas, but to minimising risks as far as possible by eliminating the personal factor to a large extent through introducing trustworthy and simple automatic devices. The ammunition hoist arrangements referred to are of this class.

In the present year the conversion of the remainder of the American turret hoists will be completed, and, wherever possible, broken hoists with entirely enclosed transfer trays will be fitted; and in those ships where this alteration will not be practicable, the entire one-stage hoist will be boxed in and provided with automatic flaps to isolate the handing room from turn-table. The older type of ammunition-hoist motors have prevented great rapidity of fire. The

American
hoisting
gear.

newer American turret designs are in general principle not unlike the mountings of the *Invincible*, but perhaps somewhat cruder so far as regards safety and interlocking devices being fitted, and simpler in construction, as steel castings are largely used in lieu of expensive steel forgings and built-up rolled steel members. The principal features of the American mountings are: All angle loading, broken hoists, closed transfer trays and trunk shafts, Williams-Janney elevating and training control apparatus, air-blast for clearing guns, and turrets under a slight air-pressure, as indicated above, to prevent any back flame or gases that have been left by the air-blast finding their way into the revolving structure. The run out of the guns will be by means of strong batteries of springs, probably placed inside the recoil cylinders, and the cradles, or "sleeves," will be steel castings, and the equivalent of British loading arms will be provided by four channel sections forming a kind of cage in which the gun recoils, so arranged as to clear the breech mechanism and loading cage, whilst two of these arms carry the Bethlehem design of "two-chain" rammers, the two chains of which work in planes at right angles to each, and lock together where they join at the rear of the gun. These rammers are therefore rigid between the driving pinions and rammer head, but flexible from the pinions outward. America has for many years employed steel castings for gun-mountings for those parts which in England are either steel forgings or bronze castings, but there seems to be a slight tendency in America to employ forgings. On the other hand, England, whilst using forgings for gun-mountings, has permitted the employment of castings for 4-in. gun shields and armour-piercing shell, both of which are being supplied by Hadfield's.

Arma-
ment of
new
United
States
ships.

With regard to the heavy guns referred to above, there appears to be divided opinion in the United States as to whether they should be of 12-in. or 14-in. calibre, and while a few experts favour a 13-in. gun, it seems to be certain that the new battleships will carry either the 12-in. or the 14-in., most probably the former. Next to these will come the 5-in. guns alluded to, and, in addition, a considerable armament of 3-in. guns. Noteworthy advances seem to have been made in the United States Navy in the equipment necessary to enable guns' crews to handle their guns rapidly and accurately. The Bethlehem Steel Company, which has in past years done a good deal to improve the means of sub-calibre practice, has introduced a mechanism to enable the man to follow the motions of a torpedo-boat, which is represented on his target, both in amplitude and interval. The representation of the torpedo-boat is made to appear as it would do in a system of waves of defined size and period, and

the gun is controlled in the usual way while employed in tube firing, and it makes a record on the target. This arrangement resembles in many respects the system employed in the British Navy, and it enables the gunlayer to improve rapidly in following and hitting the target, in which the two-hand drive already referred to assists greatly. It seems even to be surmised in America that all guns may yet be elevated by hand. With a 7-in. 45-calibre gun, weighing 16 tons, a man follows a target whose roll reaches 6 or 7 degrees, the roll being defined as the amplitude of motion on one side only of the vertical. If this be the case, the gun becomes capable of really continuous aim, and the gunlayer follows the motion of the target up and down, and never gets away from it. Such methods are not new to the British Navy, and probably advances in the same direction are not yet at an end.

The Bethlehem Steel Company has also brought out an automatic firing lock for guns, carrying the primer out of line with the vent until the last part of the screwing up of the breech-block is completed, and then putting the primer into the vent. It is claimed that by this means it becomes safe to prime the gun with the breech-block open, though, in connection with this apparatus, the ordinary safeties are used. By putting the primer into a receptacle which, by the closure of the block, puts the primer into the primer seat, greater speed of firing with the same measure of safety is alleged to be attained, because the primer, when put into the receptacle above, is as safe as it would be within the primer box of the man who primes the gun.

Bethlehem firing lock.

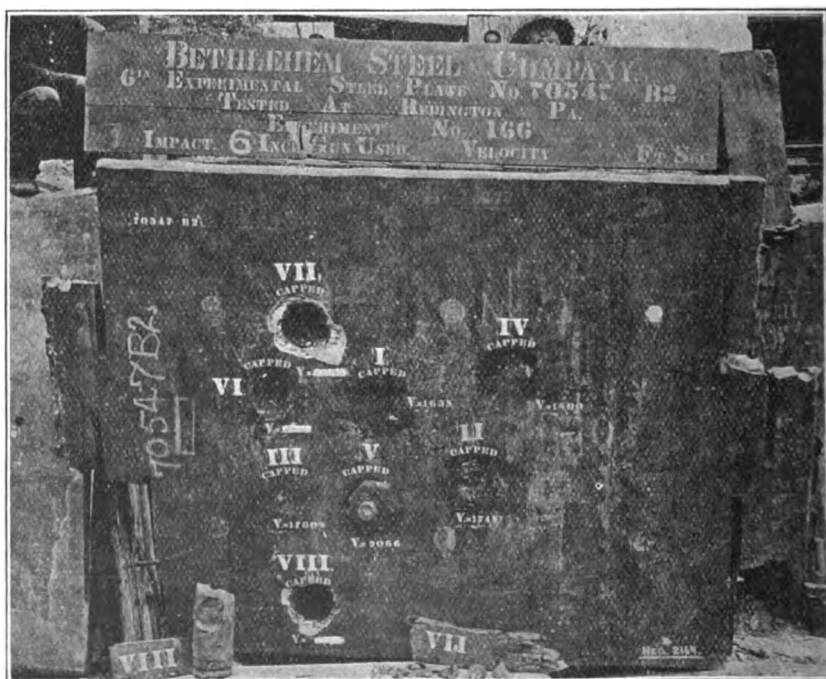
A sight of improved form has also been adopted by the same company. This consists substantially of a bar of steel extending across the top of the gun, with the telescopes mounted at the two ends of it. This bar, from its length, admits of great rigidity, and when in its mounting the bar is turned at the proper angle, the telescopes are properly set. The fault of such a plan of mounting telescopes would consist in the smallness of the range scale that could be used, but by a special eccentric motion, the range scale of these sights is made very open and convenient. Of course, the sight includes arrangements whereby the telescopes may be moved horizontally for drift or speed, but a description of these details here would not be in place.

A new American sight.

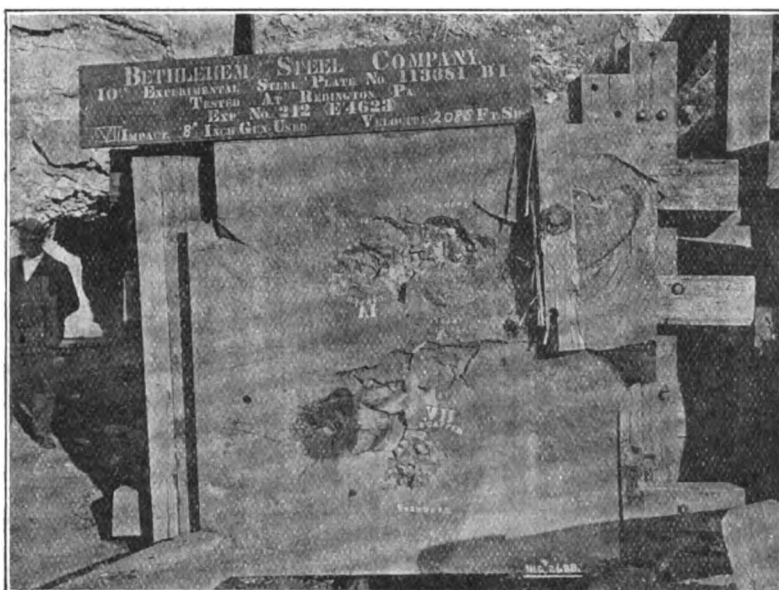
Mention may also be made of the Bethlehem Company's arrangement whereby all percussion firing is done by pulling a trigger, no lanyard being used. This mechanism is made either for automatic cocking or for continuous pull, whereby the gunlayer with the trigger referred to by a single pull both cocks and fires the gun.



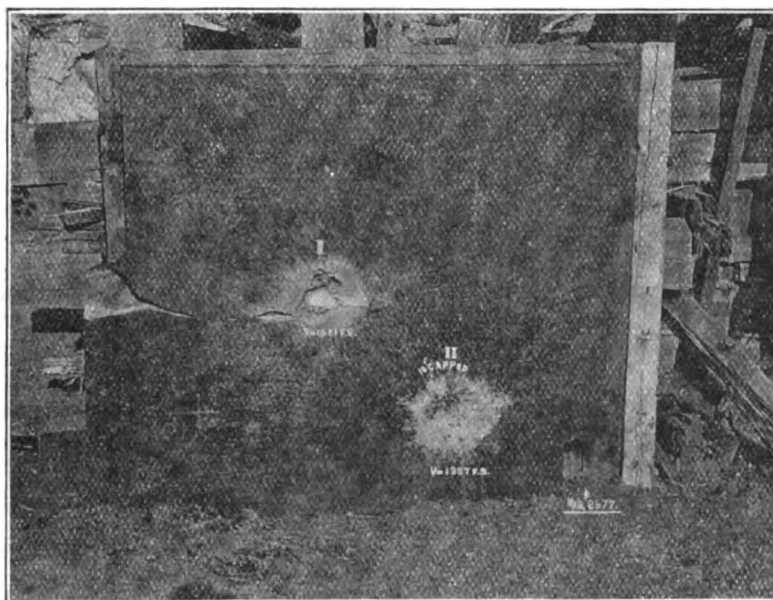
BETHLEHEM 11-9-IN. PLATE FOR U.S. SERVICE.
After attack with 10-in. A P. capped 510 lb. shell.



BETHLEHEM 6-IN. PLATE.
After attack with 6-in. A.P. capped projectiles.



BETHLEHEM 10-IN. PLATE.
After attack with A.P. capped projectiles.



Back of Plate after attack.

American
armour-
plate
trials.

It remains now to speak of certain Bethlehem armour-plates, of which illustrations are given. In the United States, as elsewhere, no special details are allowed to transpire of these trials. One of the plates illustrated on page 284 is of 11 in. thickness, tapering to 9 in., and it was tested with 10-in. capped armour-piercing shells weighing 510 lb. each. The plate was made by the company's special process, and shows small penetration and absence of flaking round the points of impact. Being a service plate, the striking velocities are blocked out, as required by the American Government, but certain other data will be seen marked on the plate in the picture. Of the two other plates illustrated we are able to give fuller particulars, they having been experimental. On the same page is shown a 6-in. plate, and all the velocities are given except the last three. Capped armour-piercing projectiles were used.

PLATE 6 IN. THICK BY 88 IN. BY 104 IN.

Rounds.	Calibre of Gun.	Weight of Projectile.	Striking Velocity.	Striking Energy.	Penetration.	Effect on Shell.
	ins.	lbs.	ft. secs.	ft. tons.	ins.	
1	6	106	1638	1974	3	Broken into fragments.
2	6	106	1748	2248	3	" "
3	6	106	1760	2279	2	" "
4	6	105	1800	2361	3	" "
5	6	105	2066	3041	through	{ Wrecked, fragments found in sand 5 feet behind plate.
6	6	105	—	—	6	{ Wrecked, all fragments fell in front of plate.
7	6	105	—	—	through	Wrecked, many fragments kept out.
8	6	105	—	—	through	Wrecked, large piece (80 lbs.) kept out.

Total energy, 20,680.

The other plate, shown on page 285, is a 10-in., and back and front views are given after attack by A.P. capped projectiles.

PLATE 10 IN. THICK BY 90 IN. BY 90 IN.

Rounds.	Calibre of Gun.	Weight of Projectile.	Striking Velocity.	Striking Energy.	Penetration.	Effect on Shell.
	ins.	lbs.	ft. secs.	ft. tons.	ins.	
1	10	510	1571	8736	2½	Broken into small fragments.
2	10	510	1371	6654	7½	" "
3	8	260	1885	6412	3½	" "
4	8	260	1971	7011	4	" "
5	8	260	2056	7628	5	" "
6	8	260	2117	8087	through	Wrecked, pieces fell just behind plate.
7	8	260	2085	7845	5½	Broken into small fragments.

Total energy, 52,373.

It will be noted that a crack to an edge (5 in. deep at edge) developed under first impact. This crack was apparently a relief to strains in the face of the plate, and was not extended or enlarged by subsequent impacts.

Admiral Mason says that armour-piercing projectiles will in future comprise the entire supply for the big guns of battleships, and he adds that a new design promises vastly improved accuracy and longer range than the existing type. It appears to be an adaptation of the principle of the "Spitze" bullet to the big projectile, giving it a more pointed head, so that it may meet with less resistance, and have a flatter trajectory at long ranges. But there are difficulties, the projectile having not only to strike hard at its long range but to use its greater striking energy with its finer head effectively against harder armour. Many attempts have been made to improve the form of the projectiles, and the present form has stood many tests. It remains to be seen whether the new American type will prove effective against the new armour-plates, to which vanadium is adding greater powers of resistance.

New
American
A.P. pro-
jectiles.

One object of the attack on the monitor Florida, in May, 1908, was to test the effect of armour-piercing projectiles on the gun turrets. Chief Naval Constructor Capps and other officers were on board in sheltered positions to observe the effect of the firing, which was carried out by the Arkansas with 12-in. and 4-in. shell, the ship lying in Hampton Roads. A 12-in. projectile struck the Florida's turret, splintered the 11-in. armour and appears to have beaten it in, but without penetration, nor were the turret and gun put out of action by the terrific impact. The skeleton mast of the monitor which had been erected for trial was standing after being attacked by three 4-in. solid projectiles, one high-explosive 4-in., and a 12-in. The latter result was highly satisfactory, and masts of the type are being placed in some of the American ships. The range in this test was about 300 yards. The Florida was attacked on June 13th by a Whitehead torpedo charged with 220 lb. of gun-cotton, and, according to Mr. Metcalf, damage was confined to the bulkhead selected for the experiment and the vital parts elsewhere were uninjured. The torpedo penetrated the half-inch outer shell and the explosion broke into a second compartment.

The
Florida
trials.

A new torpedo station has been opened at Newport, R.I., and there the Cleland-Davis double torpedo has been tried. This is a 16-ft. Whitehead torpedo, into which is fitted a gun tube of vanadium steel less than an inch thick. When the torpedo explodes on contact, the gun is automatically fired, and discharges a 10-in. shell with an initial velocity of 1100 feet into the hole

The
Cleland-
Davis
torpedo-
gun.

made by the explosion. In a trial which has been recorded the torpedo broke through a $\frac{3}{4}$ -in. steel plate, and the projectile passed through three $\frac{1}{2}$ -in. steel bulkheads, and fell into the sea beyond. The trials have been interesting, but cannot be said to have finally demonstrated the value of the torpedo gun.

GERMANY.

The
Krupp
establish-
ments
and their
products.

Turning now to Germany, we find some interesting developments. The armour and ordnance and armament requirements of the German Navy are supplied entirely by the Krupp factories, and establishments which are affiliated to them, or which they subsidise. In 1907 the share capital of the company (which was constituted on July 1st, 1903, the whole of the shares remaining in the possession of Friedrich Alfred Krupp's eldest daughter) was £9,000,000, but in 1908, £2,500,000 of new capital was raised, with the object of extending and accelerating the operations of the company, and no definite statement has been made as to the exact use to which the money has been applied. But the magnitude of the company and the extent of its resources was already known. In January, 1907, it owned the great steel works at Essen-Ruhr; trial grounds at Meppen, Tangerhütte, and Essen; collieries at Essen, taken over from Sälzer & Neuack, and the Hannover and Hannibal mines near Bochum; numerous iron-ore mines in Germany and a share in iron-ore mines at Bilbao in Spain; and three iron works on the Middle Rhine, viz., the blast-furnace plants of Mülhofenhütte near Engers, and Hermannshütte near Neuweid, and the Saynerhütte foundry and engineering works at Sayn. In addition to all these were the Friedrich-Alfred-Hütte at Rheinhausen-Friemersheim; the Annen Steel Works at Annen in Westphalia, bought in 1886 from Asthöwer & Co.; and the Grusonwerk at Buckau near Magdeburg; and the great shipbuilding yard of the "Germania" Company at Kiel was incorporated in 1902, and has since been and is now being enlarged. At Essen are produced guns of all calibres for naval, coast defence, and military purposes, with mountings, turrets, shields, disappearing carriages, hoisting and transporting apparatus for ammunition, and all kinds of gunnery appliances and accessories. At the same establishment armour-piercing, semi-armour piercing (the *semi-rupture* of the French), explosive and torpedo shells, cast iron shells, shrapnel and case shot, fuse setters, &c., are manufactured. For guns, armour-piercing shells, and armour-plate, crucible steel of homogeneous close-grained and uniform quality is produced in ingots

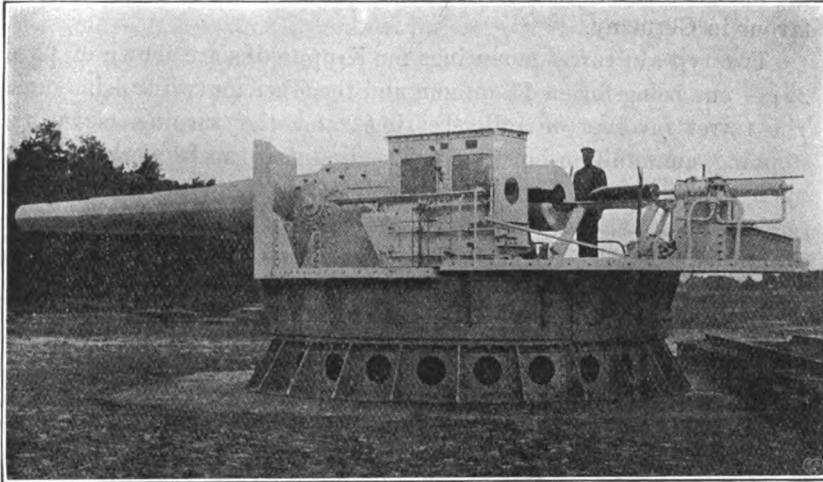
up to 85 tons. At the Grusonwerk the principal output is of chilled cast-iron armoured turrets and batteries, chiefly for land and coast fortifications, as well as armoured turrets and batteries, steel roofs and glacis, and armour for the protection of observing-stations, range-finders, search-lights, and such like. The work of gun-construction has been removed mostly from Buckau to Essen, and from the latter establishment rolled material and nickel-steel armour are supplied to the Grusonwerk. At the Germania yard, also, with which are amalgamated the neighbouring Tegel works, the whole even in 1906 being so organised as to enable the productive capacity to be increased, if required, by 30 per cent., a great deal of naval material is manufactured. At the Friedrich-Alfred-Hütte the products are pig iron and ingot steel, and at Annen Siemens-Martin and crucible steel castings. This summary of the work conducted for the German Navy and other services by the Krupp Company is not complete, and there is good reason to believe that since 1907 the ramifications of its enterprise have extended much further.

It is claimed by Krupp that German heavy ordnance is superior to the ordnance manufactured both in this country and in France, alike in the matter of endurance—the “life” of the gun—and in “efficiency,” the latter meaning the muzzle energy developed per unit of the weight of the gun. Writing in the *Artilleristische Monatshefte*, April, 1908, General Bahn, the well-known ordnance expert, attributed this assumed superiority of German guns to the excellence of the special steel used by the Krupp firm, as also to the improved jacket-and-hoop system of construction, and, in addition, to the well-designed interior shape of the gun, the weight of the projectile, and the composition of the powders, all which together, he said, ensured the highest possible muzzle velocities as well as the lowest gas pressures. It is well known that our new ships are to be armed with the 50-calibre 12-in. gun, but the General, writing with imperfect information as to what was in progress in this country, went on to say that the peculiarities of the wire system of gun construction were probably the reason why the British firms had not yet brought out 12-in. guns of 50 calibres, but had confined themselves to the Vickers 9·2-in. and the Armstrong 10-in. There is no intention of entering here into the respective merits of the wire-wound and the jacket-and-hoop gun. But, as has already been remarked, after experience which should surely be decisive, the Admiralty and British gun-makers have found the wire system to be well adapted to the making of 12-in. 50-calibre guns of unrivalled powers. Experience with the Mark VIII guns of the Majestics, and the Mark IX guns of the Canopus class, has led to enormous progress in the design and the manufacture of our

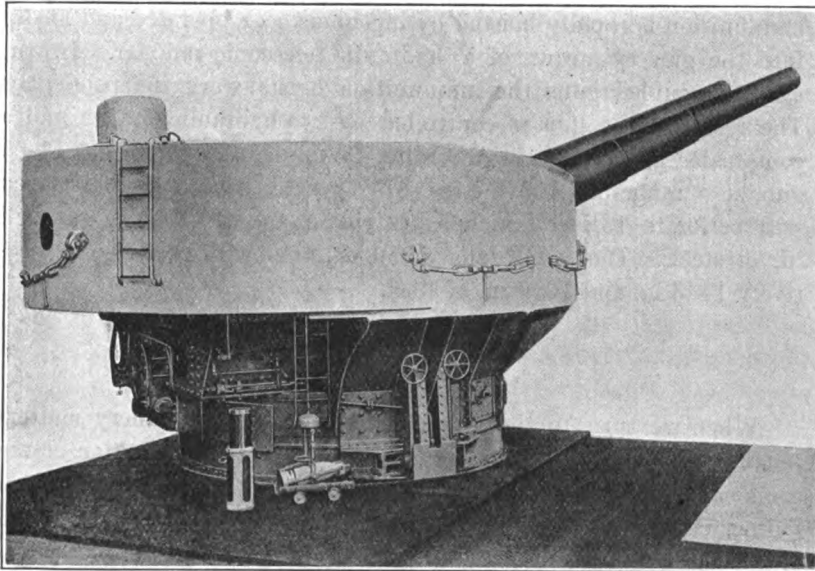
Gun endurance
in Ger-
many.

Wire-
wound
and built-
up guns.

calibres were widely different, and that the guns in construction were not governed by uniform principles. The above figures are given here as of interest, but not as possessing any final and actual value as



KRUPP TURRET-MOUNTING FOR 11-IN. GUN.



KRUPP TURRET-MOUNTING FOR TWO 9.4-IN. GUNS.

showing the relative power or value of the guns indicated, while they do not relate to the latest British types, which there is the best reason to believe are unsurpassed by any guns in the world. It does not appear, when the muzzle velocities and energies are worked out, that

the Krupp guns possess any such advantage as these figures would suggest. The chief interest in a comparison between British and German naval ordnance is in the fact that while we, upon good grounds, adhere to the wire-wound system, that system finds no favour in Germany.

Krupp
turret-
mount-
ings.

Two types of turret-mountings for Krupp guns are shown on page 291—one being for an 11-in. gun and the other for two 9·4-in. guns. The turret revolves on roller-bearings, and the turning, elevating, stopping, ammunition-hoisting and loading gear can be worked either by hydraulic or by hand power, and when the former is in use, pressure—normally of 60 atmospheres—is controlled by means of an electric pump. The turning of the turret may be rapid or very slow, and the operation of the mechanism is simple and easy. Change of elevation is effected by a vertical hydraulic cylinder below the gun-platform, which actuates the cradle of the gun, by means of articulated arms. The hydraulic mechanism for lateral movement is also underneath the gun platform. The position of the gun-layer is at the side of the gun, or between the two guns, where he can control the whole mechanism.

The arrangement is for loading in any lateral position, and the ammunition is rapidly hoisted by ingenious gear, operated and loaded into the gun by means of a hydraulic telescopic rammer. In the case of coupled guns the ammunition hoists work independently. The recoil of the gun is controlled by two hydraulic brakes and a compressed air chamber. According to the figures given, the 11-in. gun, at a range of 8000 mètres (8747 yards), with a direct impact, will perforate 13 in. of nickel steel plate, and the 9·4-in. gun 9·8 in. of steel. The same guns of 50 calibres will perforate respectively 14·3 in. and 10·6 in. of steel.

FRANCE.

Unsettled
profes-
sional
opinion.

When we turn to the French service we find gunnery matters much discussed, owing mainly to two causes, viz., the question of the armament to be given to the new battleships, and the very serious gunnery accidents that have occurred. When the Superior Council of the Navy in 1907 prepared plans for the battleships then proposed to be built, it decided in favour of a mixed armament of four 12-in. and twelve 9·4-in. guns, but this arrangement was much disapproved in other well-informed circles. It was argued that if the 9·4-in. was enough for long-range action, the 12-in. was unnecessary, and, on the other hand, that if the 12-in. was required, it would be foolish to provide an armament of inferior guns. Since this scheme was

adopted, other ideas have gained ground, and the composition of the Superior Council having been changed, there is a probability that it will reconsider the original decision. The French Naval Staff incline to unity of heavy calibre, as in the Dreadnought, while the Director of Naval Artillery makes a proposal for sixteen 10·6-in. guns in eight turrets, and is supported by M. Chautemps, reporter on the Naval Estimates. On the other hand, the Superior Naval School, by the voice of its two latest professors of strategy and tactics, seems to favour an armament of twenty 9·4-in. guns, firing three rounds per minute, with an effective range of 8000 mètres (8750 yards).

Admiral Germinet, late commander-in-chief in the Mediterranean, appears to have favoured the latter view. Probably taking the description given by Captain Semenoff of the battle of Tsushima as a definitive document, he set great value on the use of shells of large capacity, and gave orders that the *semi-rupture* shell should be used from the beginning of an action. The subject was much discussed in the French Mediterranean Fleet, and a great many officers, if not the majority, were of the opinion of the Admiral, having little confidence in the armour-piercing projectile unless it could be made to carry a large charge of explosive, and to exercise destructive effect behind armour, which few believed to be possible, while they had great faith in the *semi-rupture* shell filled with high explosive, which would pass through thin armour and spread destruction behind. These various views will show how wide, and almost irreconcilable, are the differences of opinion on this important matter in the French Navy.

High
explosive
shells :
Admiral
Germinet's view

The great gunnery disasters which began by spreading something like dismay in the French service are likely to lead to a greater sense of security than has prevailed for some time past. An account was given in the *Naval Annual* last year of the Iéna disaster, and of the report of the committee which investigated the cause of the explosion. It remains now to record the action that has been taken in pursuance of the recommendations. M. Michel, reporter of the committee of the Chamber, attributed the disaster to the decomposition of the B powder, but was not supported by his colleagues. A scientific committee, under the presidency of M. Poincaré, was investigating the subject of the powders during most of last year, and it is doubtful if a final decision has yet been arrived at. The committee of the Chamber asked that the appliance known as the *stabilisateur-révéléateur*, employed by the War Department to detect the deterioration of powders, should be tried in the Navy, but it was thought that, the powders not being identical, the same results could not be expected. The intermittent control of the Navy over the manu-

Gunnery
disasters
—Iéna.

facture of its powders has come to an end, and a system of permanent control has been established. As to powders actually in service, naval officers are now associated with the specialist officers of the artillery in the supervision of them, and the regulations have been changed to improve the system. Vessels in commission have been supplied with small stoves of a special kind for the testing of suspected powder, and officers in command will be able to verify their suspicions, and to adopt any measures necessary for safety. Moreover, a number of officers have been sent to Gâvres and Sevran-Livry to receive instruction in practical matters in connection with the handling of powder. The gunnery schools have been reorganised, and henceforth officers will undergo special courses in the science of explosives. The black powder is being suppressed, and little now remains on board. In the vessels now entering the service the mean temperature of the magazines will not exceed 86° F., and in those now building it will be about 77°.

Couronne.

The disaster which occurred on August 12th, in the gunnery training-ship Couronne, whereby several men lost their lives, was not due in any sense to the powder employed. It was an accident of the same class as those which have taken place in the Mars of the British Navy, the American Georgia and Missouri, the Japanese Kashima, and the French Gueydon. A 6·4-in. gun, 93-97 pattern, which had been firing all the morning, was being charged afresh, the cartridge and socket, with priming, were in place, and the breech was about to be closed, when it was blown out by an explosion and a terrible burst of flame, which caused another cartridge to take fire, whereby the whole of the gun's crew and men under instruction were overwhelmed with flames, some being killed on the spot, and several very severely burned, while the officers escaped by a marvel. The cause of the disaster was a return flame, and a method of rendering such accidents impossible has been under trial; the Marbec system, however, proved unsatisfactory, being insufficient to drive out the heavy inflammable gases that remain after the firing of the gun.

Latouche-Tréville.

The alarm caused by this disaster was deepened by another which occurred on board the Latouche-Tréville at the Salins d'Hyères, on September 23rd. This second misfortune, by which thirteen men lost their lives, was probably due to other causes. The gun was a 7·6-in., and classes were under instruction in the turret, the officer in command having left his position to allow one class to relieve another. The gun was charged, and the fresh crew had just entered the turret, but firing had ceased owing to the cruiser having to take up a new position. The regulation is that in such circumstances the breech shall be opened, and this was being done when a terrific explosion

took place, which killed the thirteen men and seriously injured two others, blew off the top of the turret, projected the shell about 100 mètres from the muzzle of the gun, and yet left the breech-screw undamaged. The actual cause of the disaster remained a subject of speculation, but there was some reason to believe that it might have been due to failure of the man opening the breech to observe the rules applying to such cases. Others thought there must have been something wrong with the breech or the firing arrangements to make possible a premature detonation of the cartridge. The French Navy was cast down by these repeated disasters, and the public were dismayed, but the Navy, after the manner of the sea, understanding its dangers, recognised the true incidence, and, perhaps, the inevitableness of such misfortunes, while knowing with a more perfect knowledge that no precaution can be neglected where explosives are concerned. These accumulated mischances were a principal reason for the fall of M. Thomson. The *Moniteur de la Flotte*, after discussing some gunnery matters, made the following comment:—

Notre artillerie, on le voit par ce rapide aperçu d'ensemble qui laisse dans l'ombre bien des points encore, a besoin de recevoir une impulsion, à la fois vive et éclairée, si l'on veut qu'elle réponde pleinement à ce qu'on doit attendre d'elle au double point de vue de la sécurité et de l'efficacité. Des accidents récents et douloureux ont fait douter d'elle. Il n'y a pas une minute à perdre pour remettre les choses dans le bon chemin.

Messrs. Schneider, of Le Creusot, who have specially devoted themselves to the improvement of the accessory appliances of breech-screw mechanisms, with the object of attaining greater security, have introduced a device for ventilating the inner tube of guns by means of an air-blast, intended to drive out the heavy inflammable gases and residual products of combustion, which have been the cause of so many disasters. The mechanism is designed to come into action automatically at the very instant when the breech-screw is first turned, and by the action of turning it. A current of air is driven under pressure into the breech during the whole operation of opening it, and a hand-appliance enables the current to be continued as long as may be desired, or to be cut off. It is stated that return flames are impossible with this apparatus operating, as also the entrance into the turret or casemate of the deleterious gases which are produced by the burning of some powders. A hollow steel fixture is screwed into the gun at the seat of the obturator, and is perforated with orifices directed towards the powder chamber. This appliance is in communication by an arrangement of tubes with a valve and chamber, and air is stored under pressure in the latter, which can be recharged easily or replaced. The apparatus is operated automatically by arrangements which are brought into action when the

The
Schneider
safety
breech-
blast.

breech-screw begins to turn, the air-valve being opened. The valve can also be opened and closed by means of a lever by hand. In the upper illustration on page 297 the products of combustion are seen, though indistinctly, being blown out at the muzzle by the Schneider appliance; and in the lower illustration the breech is seen open, with the air-blast blowing.

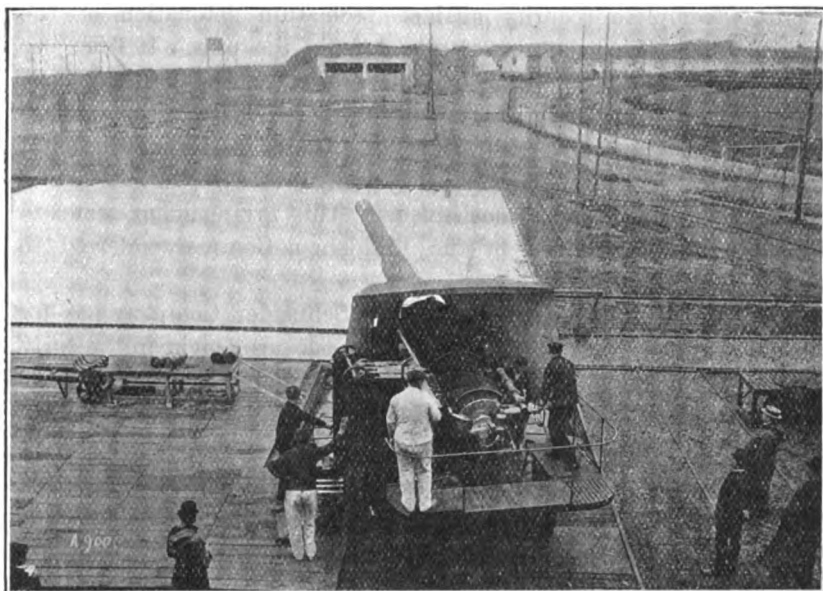
The
Creusot
works.

With regard to the Schneider firm, it may be remarked that it has establishments at Le Creusot which are fully equipped with modern gun, gun-mounting, and turret plant, foundries, machinery and machine tools, and is able to furnish the complete armament of warships, including guns, turrets, torpedoes, and all kinds of ammunition hoists and appliances. Its means of production extend from the metallurgy of the elements of guns to the full equipment of them for service. The systems adopted are practically those generally employed for rapid fire, loading at all angles, telescopic sights, electric transmission, range-finding, etc. There has been no change in the system of gun construction, the latest weapons being cast-steel on the built-up principle, with tube and hoopings designed to secure the utmost possible degree of rigidity. It is claimed that the high quality of the steel employed and the skill used in the manufacture afford the utmost guarantees of security. The French Government gun-factory, where guns of all the larger calibres are made, is at Ruelle, in the Charente, and is a sister establishment to the Guérigny forges in the Nièvre, where plates, anchors and chains are made, and the Indret machinery works on an island in the Lower Loire, near Nantes. There are also the gunnery-trial grounds at Gâvres, near Lorient, and the powder factory and laboratory at Sévran-Livry.

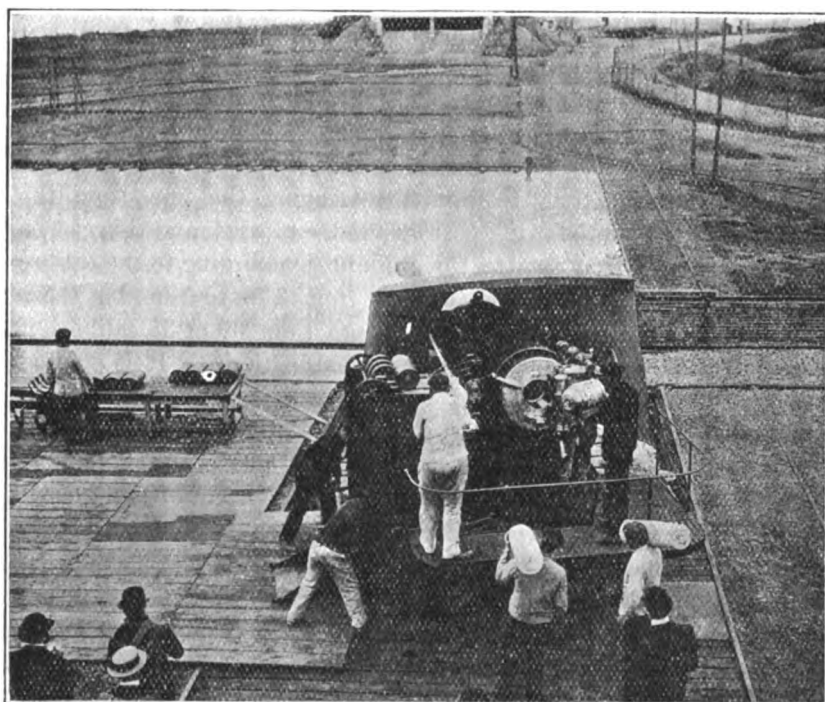
French
Govern-
ment
factories.

Schneider
guns and
safety ap-
pliances.

But the Creusot establishment is also able to construct 12-in. guns, and it has supplied 6-in. guns to Spain and 4-in. guns to Mexico, all of them 50 calibres. The French Navy has adopted its semi-automatic 3-in. 60-calibre gun as the anti-torpedo armament of the ships of the Danton class. This gun was described in the *Naval Annual* of 1906, with some details, and it is unnecessary to recur to it at length, except to note that its power has been increased, and that it has been fitted with telescopic sighting gear. One of the improvements introduced by the Schneider Company consists of a safety arrangement for percussion firing, but also applicable when electric firing is employed. The object is to make premature detonation impossible, and this is accomplished by an ingenious arrangement whereby the striker or electric contact is located excentrically with regard to the axis of the gun until the breech is completely closed, and is brought into position for detonation by the action of screwing in the breech. By this means it is claimed that



SCHNEIDER AIR BLAST: BREECH CLOSED.



SCHNEIDER AIR BLAST: BREECH OPEN.

there is complete security against premature detonation of the charge, which has led to many disasters in the past. If from any cause the percussion striker should project when the breech is closed, it will come into contact with an inert surface of the driving-band until the breech is screwed tight. There are several forms of this adaptation, and they have been studied with a view of fitting them to existing breech mechanisms. This arrangement seems to resemble one introduced by the Bethlehem Company referred to above.

Proposed
disappear-
ing anti-
torpedo
arma-
ment.

Another novelty introduced by the Schneider Company has for its object the protection of the anti-torpedo armament in the early stages of an action, and has been devised to render it impossible for the exposed small guns to be shot away, as was the case in the battle of Tsushima. Many years ago in this country a suggestion was made that ship guns should be mounted on a disappearing system, somewhat after the manner of fortress guns, but it was dismissed by gunnery authorities as impracticable. The Schneider firm do not think such is the case with the smaller guns. In their system the anti-torpedo guns remain completely eclipsed and protected until it is wished to bring them into action, in armoured tubes resting on the protective deck, their shields sheltering them from the effects of downward explosions. The gun is mounted on a carriage which is moved up and down by hydraulic or other power, and is in connection with an ammunition-hoist. When the gun is to be brought to the eclipsed position, it is brought to the vertical, and can then be lowered. The mechanism has been designed with the object of minimising the time required for bringing the gun from the eclipsed position to the firing position, and *vice versâ*, and this can be brought about in from two to three minutes, according to the calibre of the guns so mounted, which may be from 3-in. to 5-in., but those of 4-in. and 5-in. should not be of more than 30 or 35 calibres, if the weight is to be kept within reasonable limits. It is pointed out that unity of calibre could be preserved in the eclipsed guns and others of the same character mounted in the ordinary way. The velocity of guns of the length indicated may be from 2300 ft. secs. to 2450 ft. secs. and it is claimed that they would be efficacious against destroyers and torpedo-boats at from 3000 to 3500 yards.

The Schneider Company explains another advantage claimed for their system of disappearing mountings for guns. "Ce mode d'installation d'autre part réalise un avantage qui n'échappera à aucun constructeur naval: il permet de choisir les emplacements des pièces d'une fraction de l'artillerie sans se préoccuper des interférences possibles avec les canons en tourelles, puisque ces pièces seront

eclipsées sans que la grosse artillerie sera en action. Or le choix des positions de l'artillerie secondaire de façon qu'il n'en résulte aucune gêne pour le tir de l'artillerie principale, et réciproquement, ne constitue précisément un problème simple. Ces difficultés disparaissent en grande partie avec le système de la Maison Schneider." The proposed system is ingenious, and it remains for ship-constructors to say whether it is practicable consistently with the internal arrangements of ships, and for gunnery officers to say if it would be wise to place a part of the armament of the ship in such a position that it could not be brought into immediate action, and to fix its effective range at a maximum distance of 3500 yards. Progress may be expected to be made in this direction, and the Schneider arrangement is designed to solve an admittedly difficult problem. Perhaps it may open the way to further developments.

Reference has been made to the great favour which high-explosive shells of large capacity enjoy in France, but it is not to be supposed that they are intended or likely to displace the armour-piercing projectile from the position it has held so long. The provision in the ships of the Patrie class was of armour-piercing shell and of *semi-rupture* projectiles to carry a considerable charge, and intended to explode after passing through thin armour—mêlinite shells being suppressed. In the Dantons it has been proposed to employ only one kind of shell, known as the *projectile alourdi*. This shell was tried at Gâvres and against the Iéna, but the results are confidential. It is longer and heavier than the *semi-rupture* projectile, contains twice the quantity of explosive, and will pass through a moderate thickness of steel without bursting. This solution did not satisfy many people, some advocating lesser penetration and more explosive, and many thinking that there was danger in sacrificing greater penetration for the amount of explosive contained in the *projectile alourdi*, unless armour-piercing shell were also supplied. Explosive shells of large capacity are known to have given disappointing results against the armour of the Iéna.

The French projectile *alourdi*.

The Schneider firm has for a long time been manufacturing both classes of shell, and is enlarging its works to enable it to make a larger output. Its armour-piercing shell have recently, under prescribed conditions, perforated with oblique impact cemented plates with a thickness at least equal to the calibre of the gun. The details of these trials have not been disclosed, but they have brought a premium to the makers. They are also making large-capacity shells of cast steel, and appear to have effected some improvements in the process of manufacture. Their works have a capacity for turning out 50,000 shrapnel or large-capacity shells per month. The

Creusot A.P. and other projectiles.

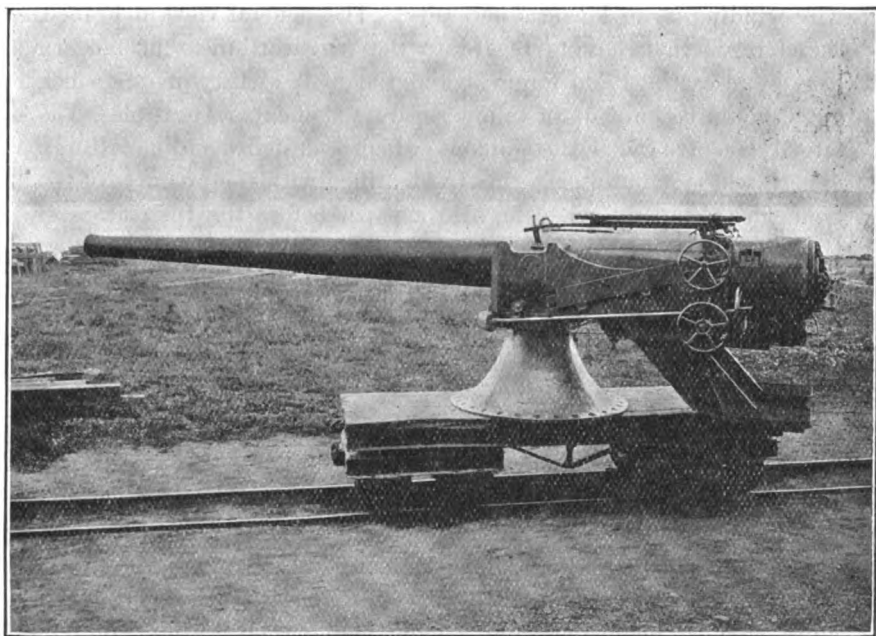
assembling and fitting of the shells takes place at the Schneider factory at Harfleur, near Havre, the fuses coming from the factory which is adjacent, and the castings from Le Creusot. The firm has a special fuse for penetration operated by centrifugal force (*s'armant par la force centrifuge*), said to insure great safety in transit as well as in firing, and to have a degree of sensibility that can be regulated at will, fitting it especially to be used with explosive shell. The explosive used by the firm is named "Schneidérîte." It has a nitrate base and is said to possess great insensibility to shock.

Homé-
court
Works.

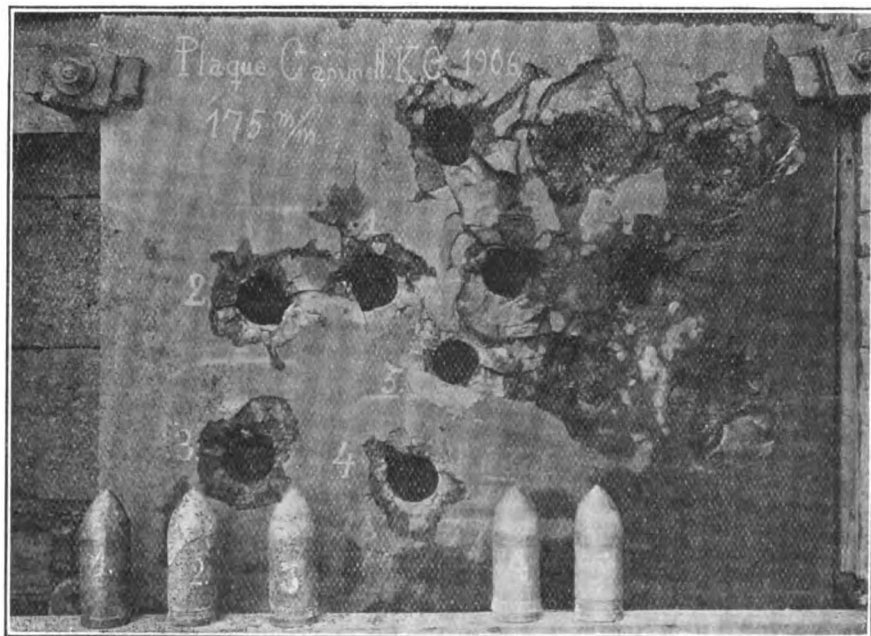
There is no space here to do justice to the very important French company of the Forges et Aciéries de la Marine et d'Homécourt, which has extensive works at Saint Chamond, Assailly, Rive de Gier, and Givors in the Loire, and foundries and other establishments, as well as coal and iron mines, in various parts of France. Armour-plate, guns, gun-mountings, fuses, projectiles of all classes, turrets, etc., are produced in large quantities for the French Navy, and have a high reputation. At the Franco-British Exhibition a 4·7-in. shielded gun, a 7¾-in. plate after trial at Gâvres, and many projectiles of various classes were shown. The company has a 7·6-in. 50-calibre gun, with single and double turret mounting, and guns of 9·4-in., 50-calibres, and 12-in. 45-calibres, both with double turret mountings. The 12-in. gun has a powder charge of about 330 lb., and a projectile of 978 lb. with an initial velocity of 2723 ft. secs. The powder charge is contained in four cartridges, and the gun fires two rounds per minute, with continuous aim. The extreme elevation is 12 deg. and the gun can be loaded at any elevation up to 8 deg. In the case of this calibre, as of the others, the turret and all the aiming gear, as well as the ammunition hoisting arrangements, are operated electrically, but, in case of breakdown, everything can be worked by hand. The breech is opened and closed by hand, but the charge is worked in ordinary circumstances by electricity. Each gun is independent of the other in loading and elevation.

System of
French
gun-con-
struction.

Before we leave the French constructors some general remarks may be made upon the system of gun-construction adopted. It has been seen that in Germany there is no disposition to depart from the barrel and hoop principle of building up guns, of the merits of which no doubt is expressed anywhere. This is also the case in France. Possibly if gun steel remained of the same non-homogeneous quality that was its character when the wire-wound system was introduced, another view might be held; but enormous advances have been made, and it is contended that metallurgists can now produce steel in large homogeneous castings, free from defects, and of such splendid quality, high-elastic limit, and breaking strain, with great elongation, that



BOFORS 5.9-IN. 50-CAL. GUN.



CAMMELL K.C. (1906) PLATE.
Attacked with Bofors A.P. Projectiles.

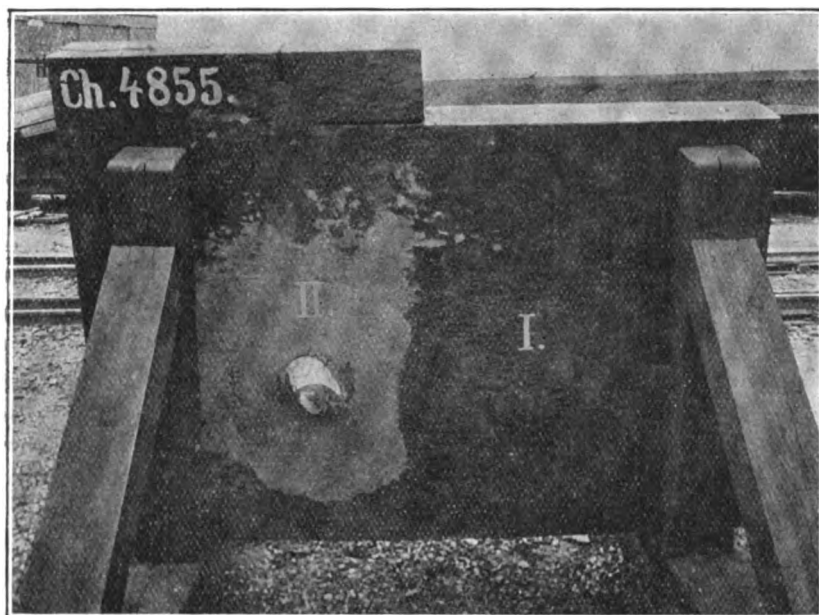
wire-winding is no longer a necessity. The general view in France, therefore, is that, having regard to the trustworthiness of modern heavy gun castings and forgings, and the high quality of gun steel, guns should be built up of as few separate elements as possible. The late M. Gustave Canet, the eminent ordnance designer and metallurgy expert, whose name was so closely identified with the products of the Schneider Company, when he read a paper before the Institution of Civil Engineers in November, 1907, expressed these views with great conviction, and said that the inner tube of the gun should have reasonable thickness, with a rear jacket having a cross-sectional area not greatly different from that of the tube at any point, and shrunk on to it.

SWEDEN.

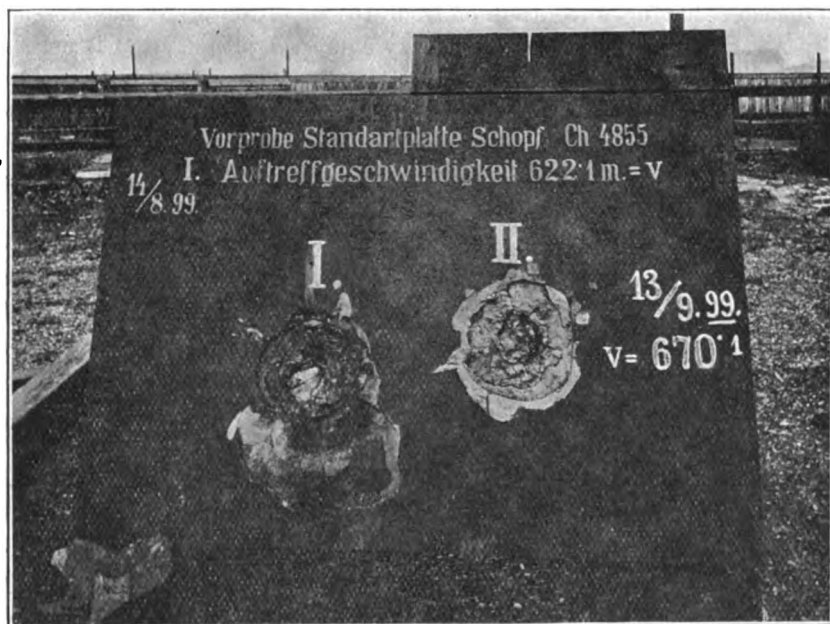
Bofors
steel
castings
for guns,
shells, &c.

It is held in many quarters that foreigners have gone ahead of us in the production of homogeneous high-quality steel castings, for guns and shells, and they are used by Krupp, Schneider, St. Chamond, Bofors, Skoda and the Bethlehem Company. Probably in no country are steel castings employed to such an extent as in Sweden, where guns, shields, mountings and armour-piercing projectiles are now made from specially treated castings by the Bofors works. We illustrate on page 301 a Bofors gun constructed on this principle, having a calibre of 5·9 in. and a length of 50 calibres. The following are leading particulars of weights:—gun, 16,640 lb.; mounting, 12,230 lb.; projectile, 112·43 lb.; charge, 35·27 lb.; muzzle velocity, 2658 ft. secs.; maximum pressure 16·19 tons per square inch. The Bofors Company is also successful with specially treated shell, and the lower illustration on the same page shows the firing results at a 1906 Cammell K.C. plate. The following are the data of the trial, the projectiles being armour-piercing, weighing 100·2 lb., and the striking distance seventy-six yards from the gun:—

Round.	Charge.	Striking Velocity.	Per cent. De Mare Formula.	Remarks.
		ft. secs.		
1	11·91	1990	132·0	{ Projectile pierced plate, and was recovered whole; increase in diam., ·0276 in.
2	12·25	2005	133	{ Projectile pierced plate, and was recovered in two parts; increase in diam., ·059 in.
3	12·25	2000	132·5	{ Projectile pierced plate, and was recovered whole; increase in diam., ·059 in.
4	11·58	1950	129	{ Same as round 3; increase in diam., ·0394 in.
5	10·81	1869	124	{ Pierced plate, projectile recovered whole immediately behind plate, turned to right, proving that the limit of penetration had been attained. Increase of diam., ·0787 in.



Back View of Plate.

WITKOWITZ-KRUPP 5.9-IN. PLATE.
After attack.

AUSTRO-HUNGARY.

Austria's
armour
and gun
works.

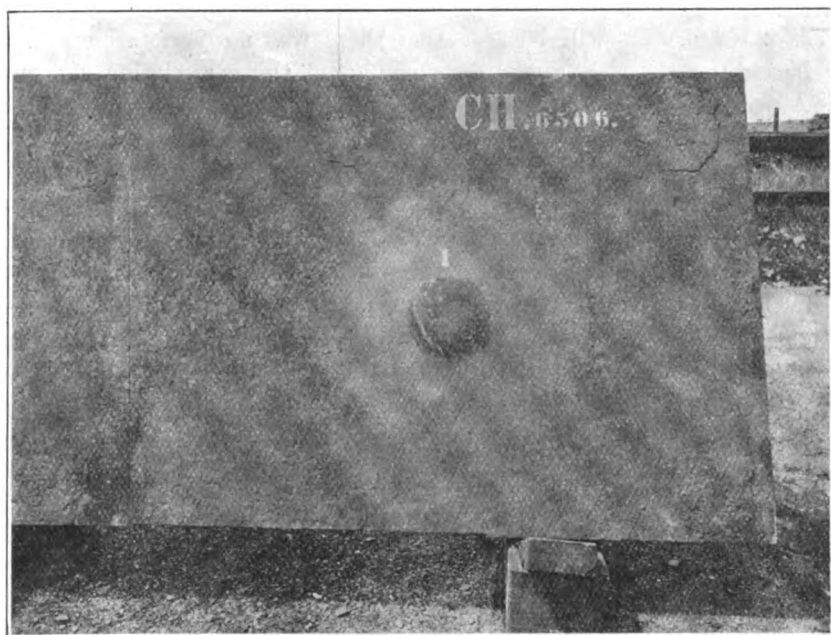
The guns of the Austro-Hungarian Navy are manufactured at the "Skodawerke," Pilsen, ranging downward from the 12-in., apparently of 45 calibres, to semi-automatic 12-pounders and smaller guns. The chief armour factory is the Witkowitz Bergbau- und Eisenhütten-Gewerkschaft, but armour-plating is also made by the Poldihütte works, near Prague, and at the Skoda establishment. In Austria, as elsewhere, great advances have been made in all that concerns metallurgy and gun-making. Progress still continues, and the establishments have been and are being enlarged to meet the needs of the expanding fleet.

The Wit-
kowitz
works.

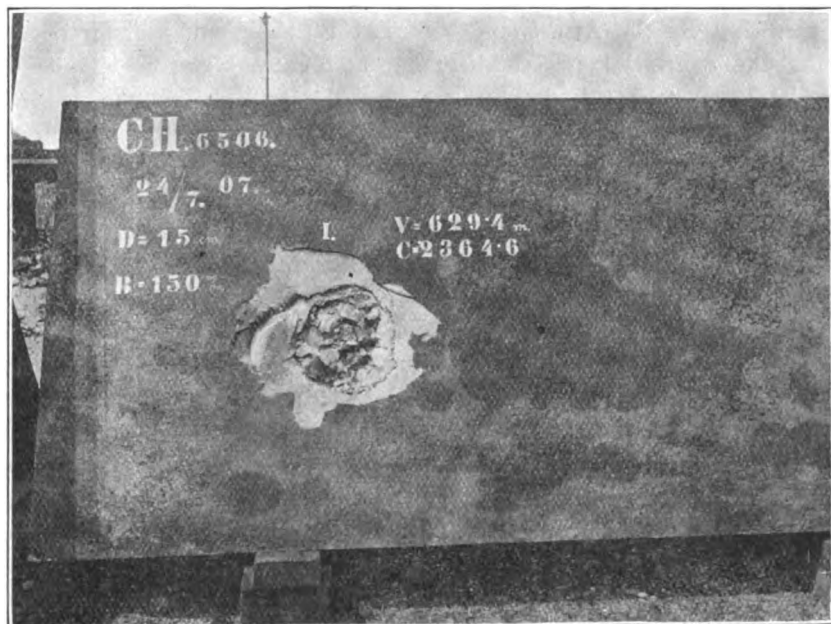
The production of armour began at the Witkowitz works with the manufacture of the so-called compound plates, but these ceased to be made in 1887, when the production of homogeneous water-hardened steel plates began, which were used for the Danube monitors and the cruiser Kaiserin und Königin Maria Theresia. Hardened high-percentage homogeneous nickel-steel plating was then produced, answering to the requirements of 1894-96, and was used for the Monarch, Wien, Budapest, and Karl VI. With the contemplated increase of the fleet the works and establishments were enlarged for the manufacture of armour, shells, and gun steel, with eight Martin furnaces, having an output of from 15 to 35 tons. At the present time these important works are fully equipped with all that is necessary for the production of Krupp steel plates on a large scale, including seven Siemens regenerative furnaces, large oil well, 105-ton crane, electric machinery, &c. Water hardening is performed by means of three electrically driven centrifugal pumps forcing the water through 5080 tubes. Every apparatus for casting, rolling, hammering and working armour plates, steel for shells, castings of all kinds, constructional steel, &c., now exists at Witkowitz. There is a laboratory and also a trial ground for the testing of armour plates, the output of which is 7000 tons yearly. The official tests take place at Pola. Witkowitz has separate departments for the manufacture of shells and of tubes and hoops for guns.

Witko-
witz
armour-
plate
trials.

Illustrations are given of two Witkowitz Krupp plates of the lot to be used for the new 14,500-ton battleships, and they will show the manner in which they have stood the test. On page 303 is shown a 5·9-in. plate tested by a gun of the same calibre, the first shot being with an impact of 2040 ft. secs., giving a co-efficient by the De Marre formula of 2290, and the second with 2198 ft. secs., and a co-efficient of 2325. On page 305 another plate is seen of the same thickness, which has undergone the same test, the projectile having



Back View of Plate.

WITKOWITZ-KRUPP 5.9-IN PLATE.
After attack.

X

a striking velocity of 2063 ft. secs., and the co-efficient being given as 2364·6. It will be seen that there was no perforation. An illustration is also given on page 307 of thinner plating for the Austrian Navy, but no data have been made public. In the case of all these plates both the front and back are illustrated in order to show better the results of the firing.

In Austria, as elsewhere, the adoption of a ship-building programme has had the effect of inducing or compelling manufacturers to lay down extensive ship-building and gun-making plant for naval purposes, and the enlargement of the Witkowitz establishment is illustrative of what is taking place elsewhere in Austria. The very important ship-building establishment of the Stabilimento Tecnico at Trieste is sharing in the development, and has recently taken over a share in the yard of the Allgemeine Oesterreichische Baugesellschaft at Linz, which is to be greatly extended.

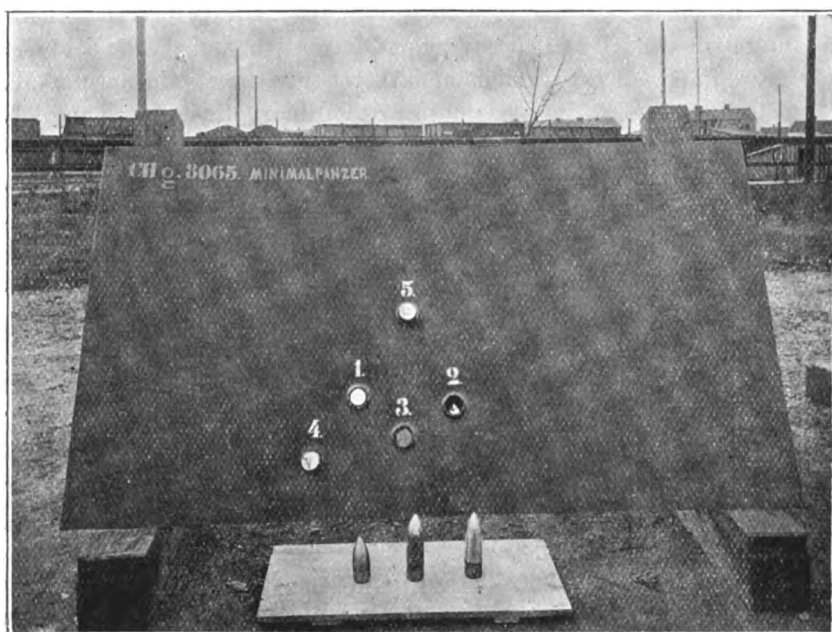
ITALY.

Guns and
armour.

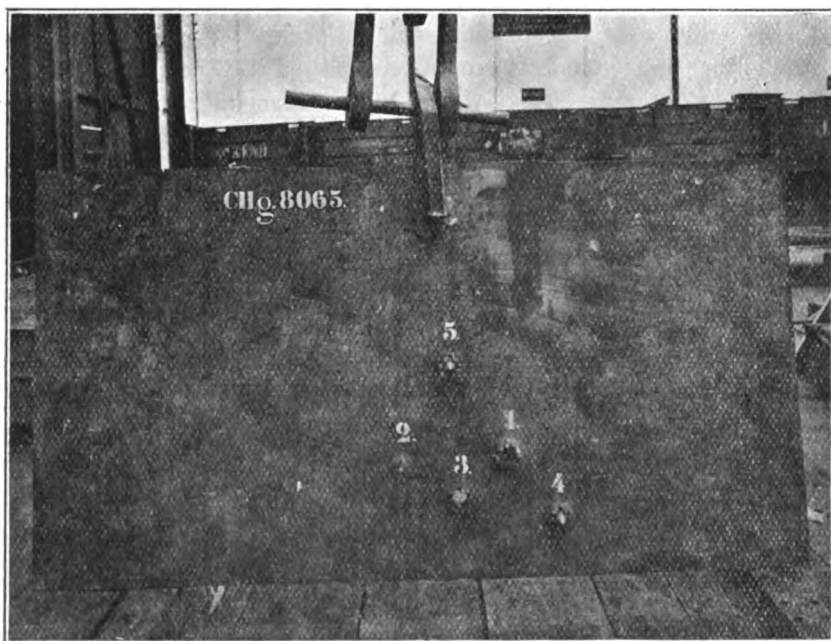
The space allotted to this section of the *Naval Annual* is almost exhausted, and therefore we must sketch lightly the conditions that exist in Italy, and not attempt to deal with the resources of Russia and Japan. The Italian Government has no gun, armour-plate, or torpedo factory of its own, and all the guns for the Fleet have been furnished by the Armstrong factory at Pozzuoli, and the torpedoes by the Schwartzkopf establishment at Venice. The Società degli Alti Forni at Terni, with iron mines in the Val Trompia and of lignite at Spoleto, provides armour-plating, gun-turrets and armoured cupolas, and the elements of guns, as well as all kinds of plating and constructive steel, and crucible steel and Siemens-Martin steel in ingots up to 80 tons. The Società Italiana di Fonderie in Ghisa e Costruzioni Meccaniche, with establishments at Sampierdarena and Cogoleto, and other works in various parts of Italy, produce steel and other requirements for naval purposes.

Modern
shells—
an Italian
opinion.

The strong movement in favour of high-explosive large-capacity shells, which have been so prominent in France, has had its echo in Italy also. Captain Ettore Bravetta, of the permanent committee of the Navy at Spezia, has expressed very strongly his view that shells of this class are destined to effect a revolution in naval warfare, and that the nation which first realises the advantage, and is able to apply the new possibilities practically, will out-distance its rivals. His essay has been translated into German in the *Zeitschrift für das Gesamte Schiess—und Sprengstoffwesen*, and has attracted a good deal of attention. He says it is characteristic of the present time that



Front View of Plate.



ARMOUR-PLATE MADE AT THE WITKOWITZ WORKS FOR THE AUSTRIAN NAVY (back view).

x 2

every nation is renewing or increasing its naval resources, that there is unrelenting activity in discovery and invention, and that it is of the utmost importance to understand thoroughly the significance of all modern progress. There has been extraordinary diversity of opinion in the past, and the same diversity may remain. There are some who would use exclusively capped armour-piercing shell, with explosive charges, which they hope may do damage behind armour; others who advocate large-capacity shells, which are to spread destruction by the intensity of the action of their explosive contents; other again who think it possible to effect a compromise by means of the semi-armour-piercing shell, carrying a considerable charge, which has found such favour in France.

With reference to the armour-piercing projectile—the *obus de rupture* of the French, and the *Panzergeschoss* of the Germans—Captain Bravetta remarks that to perforate armour of a thickness equal to the diameter of the shell, at a range of 6000, or even 8000, mètres (6560 to 8750 yards), the shell having sufficient resistance, and containing enough explosive to damage the vital parts of the ship, is an achievement of the utmost difficulty. He admits that very good capped shell filled with trinitrotoluol, ammonal, stibiovirite, or other such explosives, may perforate armour on the trial ground, but he questions whether the same effects can be expected with great striking velocities at extreme ranges. There is no reason to question that a solution of the difficulty will be arrived at, he says, but he thinks that decisive effects cannot be expected with projectiles of the kind. As to the *semi-rupture* shell of the French, Captain Bravetta dismisses it as an indecisive kind of projectile, and says it is based upon false ideas of modern requirements. He quotes what the *Marine Française* has had to say on the subject: “Hélas! le nouveau-né, sur lequel on avait fondé les plus belles espérances, portait en lui-même des germes morbides dont son organisme ne pût triompher.”

Torpedo-shells.

As will be seen, the Italian authority is all for the shell of large capacity—the torpedo-shell—as a development of previous types, which, however, still exist, but which should now be relegated to the museum. Captain Bravetta states his conception of what such a shell should be. It must be made of the best steel, calculated to withstand the gas-pressure of modern guns, and must have the greatest initial velocity attainable. Its explosive charge must correspond with its calibre, but must not be less than from 25 to 40 kilos (55·12 lb. to 88·18 lb.), and it must have a perfectly trustworthy fuse, coming into operation on striking the desired object. The bursting of such shells, says Captain Bravetta, on board warships, will destroy everything above deck, and spread smoke, flame, and

asphyxiating gases below. He concludes that the steel shell, containing the heaviest possible explosive charge, is the projectile *par excellence* for long-range action, and that the fleet that employs armour-piercing shell in the next sea fight will be defeated by an adversary who makes use of large-capacity, high-explosive shell of the kind indicated.

These remarks of the Italian authority are an illustration of the fact that the actions of the future will be fought in new conditions altogether. The lessons of Tsushima cause many to lean to the opinion he expresses, but whether we agree with him or the reverse, there can be no question that we live in a time of profound change in our conception of the conditions of naval warfare. The importance of reading aright the signs of the times requires no emphasis in this place. Guns of far greater power, armour of higher resistance, new explosives, a torpedo of much longer range, the certainty that actions will be fought at great distances—all these things profoundly affect the whole subject of the protection of warships by armour, and the armament with which they are to be supplied. There has been no attempt in this part of the *Naval Annual* to decide either one way or the other in the controversies that have been alluded to. The only object has been to illustrate the situation at the present time, to describe as far as may be the resources of the principal Powers, and to indicate in what way their naval constructors and ordnance experts approach the solution of the grave problems that are presented by the new state of things.

Conclu-
sion.

BRITISH RIFLED ORDNANCE.

ORDNANCE.										Charge (cordite).		Projectile.					Ballistics (with full charges).								
Calibre or Pr.	NATURE.	Weight.	Mark and Service.*	Total length in inches.	Length of Bore, including Chamber.	CHAMBER.		RIFLING.		System,†	Weight.	Size.	Diameter.	Weight.	Bursting Charge of Common shell.	Value of $\frac{d^2}{w}$.	Value of $\frac{d^2}{w}$.	Muzzle velocity.	Total muzzle energy.	Perforation of wrought iron.			Perforation Krupp steel, 3000 yards. Unclipped Shot.		
						Diameter (at largest).	Length to base of projectile.	Least at breech.	Greatest at twist one turn in.											At 1000 yards range.	At 2000 yards range.	At 3000 yards range.			
B.L. GUNS.																									
16.25-in.	110½ tons.	III.		524 0	30.0	ins. 21.125	ins. 84.5	cala. 30	cala. 30		lbs. oz. 960½ S.B.C.		ins. 16.25	lbs. 1800	{ ‡1193 ‡1193 ‡1179½	{ 0.147 0.420	2087.54	3360.38	0.34	6.31	7.29	4	13		
13.5-in.	{69 & 67} tons.	I. II. III. & IV.		433.0	30.0	18.0	66.5	30			187 8	..	13.5	1250	**85	0.146	0.508	2016.35	280	0.30	2.27	6.25	2	11	
12-in.	46 tons.	VIII. Wire		445.5	35.43	16.0	70.0	30			167 8	50	12.0	850	80-1½	0.169	0.492	2367.33	0.92	7.29	4	26.6	11½		
12-in.	50 tons.	IX. Wire		496.5	40.0	17.5	87.2	..			201 8 9 8	50 3½	12.0	850	"	..	{ 2481.36 2580.39	200.39	7.35	4	31	6.28	7	12½	
12-in.	58 tons.	X. Wire		558.0	45 0	..	..	..			325 0 M.D.	..	12.0	850	..	..	..	2900.47	697.51	0.46	2.42	0.38	4	17
10-in.	31 tons.	{Triumph & Swiftsure}		483.0	45.0	14.0	64.5	10.0	500	\$2800	927.205	39	5.34	6.30	2	27.0	11½
10-in.	29 tons.	{II. III. III.⁴ & IV.}		342.4	32.0	14.0	54.0	30			76 0	30	10.0	500	37½	0.200	0.500	2040.14	430.24	8.21	8.19	3	17.0	7½	
9.2-in.	{21 & 22} tons.	I. & II.		255.8	25.56	11.0	44.0	35			42 0	30	9.2	380	{ 18 ‡133 ‡30.4½	{ 0.223 0.488	1781	8,356	18.8	15.9	14.4	12.4		5½	
9.2-in.	{24 & 22} tons.	III. V. VI. VI.⁴c & VII.		310.0	31.5	12.0	43.0	30			53 8	30	9.2	380	{ 0.223 0.488	2065.10	910.22	9.19	8.17	2.15	5		6½		
9.2-in.	25 tons.	Wire VIII.		384.0	40.08	10.5	53.15	..			63 0	40	9.2	380	..	0.223	0.488	2847.14	520.27	6.23	9.20	7	18.0	7½	

9.2-in. ††	28 tons.	Wire X.	442.35 46.6	13.0	71.215	Various in the	P. Elswick, Hook, or	103 0 44	9.2	380	..	0.223 0.488	{ 2640 18,400 33.3 28.9 25.0 22.0 9.4
7.5-in.	16 tons.	{ Triumph & Swiftaure }	386.7 50.0	..	46	..	..	..	..	200	..	0.281 0.474	{ 92800 20,685 36.0 31.2 27.4 24.0 10.4
7.5-in.	14 tons.	..	337.5 45	11.1	55	30	30	{ 47 0 30 } { 2 8 2 1 }	7.5	200	18.4	0.281 0.474	{ 2800 10,883 29.0 24.9 21.4 17.8 7.4
6-in.	5 tons.	III.	170.7 25.53	8.0	26.75	35	35	{ 14 12 20 }	{ 6.0 }	100	{ 7.4 } { 9.13 }	0.360 0.463	{ 1960 2,665 13.4 10.7 8.9 7.0 3
6-in.	7.4 tons.	{ IV. VI. }	173.5 26.0	8.0	26.75	{ 35 } { 30 }	30	20 0 20	6.0	100	9	0.360 0.463	{ 2493 4,308 19.6 15.3 11.9 9.8 4.4 } { 92760 5,250 22.3 18.0 14.6 11.6 5.5 }
4-in.	{ 23 cwt. } { 26 cwt. }	{ III, III, III, IV. V & VI. }	120.0 27.0	5.3	18.5	120 30	30	3 1 5	4.0	25	{ 1.4 } { 3.18 }	0.640 0.391	{ 1900 625 7.7 5.4 4.0 3.0 .. }

* The Roman numeral is the number of the pattern given. Further differences in pattern are indicated by letters a, b, and c. Some details of the 12-in. Mark X uncertain.

† P. means Polygroove; Pl., Plain; ‡ Cordite has not been introduced for this gun; § Estimated with M.D. cordite; ** Cast steel; †† A 50-calibre 9.2-in. gun is under construction; †† Forged steel.

BRITISH RIFLED ORDNANCE—continued.

ORDNANCE.										Charge (full).		Charge (cordite).		Projectile.					Ballistics (with full charges).					
NATURE.		Weight.	Mark and Service.	Total length in inches.	Length of Bore, including Chamber.	CHAMBER.		RIFLING.		Weight.	Weight.	Size.	Diameter.	Weight.	Bursting Charge of Common Shell.	Value of sh.	Value of sh.	Muzzle velocity.	Total muzzle energy.	Muzzle energy per ton of gun.	Perforation of wrought iron.			
Calibre or Pr.						Least at breech.	Greatest at muzzle.	Twist one turn in	System.*												lbs.	lbs. oza.	ins.	lbs.
QUICK-FIRING GUNS (using metal cases)																								
6.0 in.	.. ..	7 tons	I. & III. II. (Wire)	249.25	40	..	60	30	..	..	13 4	30	6.0	100.0	..	0.360 0.463	(2200)	3356	479	15.9	12.7	10.2	8.2
6.0 in. Q.F.C.	.. ..	5 "	I. to VI.	169.1 166.6	26.2 26.6	..	..	..	..	..	..	..	..	..	..	..	1913	2537	362	13.0	10.3	8.2	6.4
4.7 in.	.. ..	41 cwt. 42 "	I. II. III. & IV. Wire	194.1	40	..	100	31.4	..	..	5 7	20	4.72	45.0	..	0.495 0.428	2188	1494	711	12.4	9.2	6.6	5.0
4 in.	.. ..	26 cwt.	I. II. III. Wire converted guns	165.25 120	40 28	..	..	30	M.P.I.	..	3 9	15	..	25.0	..	0.640 0.390	(2300)	917	705	10.5	6.9	4.9	3.3
12-pr.	.. ..	12 cwt.	I.	123.6	40	..	..	120	E.O.C.	..	1 15	10	3.0	12.5	..	0.072 0.463	2210	423	677	8.1	5.3	3.5	2.4
12-pr.	.. ..	8 cwt.	I.	87.6	28	..	..	0	E.O.C.	..	13 1/2	10	3.0	12.5	..	0.072 0.463	1607	223.8	544	4.9	3.2	2.4	..
Hotchkiss . 6-pr.	..	8 cwt.	I. & II.	97.63	40.0	..	..	180	M.P.I.	..	67 1/2	5	2.24	6.0	..	0.836 0.534	1818	137.5	344.8	4.8	2.8	..	..
Nordenfellt . 6-pr.	..	6 cwt.	I. II. & III.	104.4	42.3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Hotchkiss . 3-pr.	..	5 cwt.	I. & II.	80.63	40	..	..	25	M.P.I.	..	66 1/2	5	1.85	3.3	..	1.037 0.521	1873	80.3	321.2	4.1	2.1	..	..
Nordenfellt . 3-pr.	..	4 cwt.	I. L.	91.5	45.4	..	..	..	..	..	..	..	..	..	..	..	1920	84.3	337.2	4.3	2.2	..	..
MACHINE GUNS.																								
Maxim, 1 bar 0.45 in.	..	63 lbs.	I.	45.0 42.88	..	..	..	10	27	End of shell	..	..	0.450	480	..	2.952 0.751	..	..	..	..	..	..	..
.. 308	.. ..	..	..	..	..	..	..	10	25	End of shell	..	..	..	215	..	..	..	..	..	..	..	..	..
																		..	..	Same as M. H. Rifle.			
																		..	..	Same as Lee-Metford.			

* F. means Polygrooves; M. II., Modified plain.

b With 4 grs.

Note.—An additional 10 grs. shell has now come in for the 6-in. guns.

AUSTRIAN NAVAL ORDNANCE.

Designation by Calibre, in centimètres, length in calibres, and type of gun . . .	30.5 { L. 45 Skoda.	30.5 L. 35 K. 80	24 L. 40 K. 01	24 L. 40 K. 94	24 L. 35 K. 86	19 L. 42 Skoda.	15 L. 40 Skoda.	15 L. 35 K. 86	15 L. 35 K. 80	12 L. 40 Skoda.	12 L. 35 K. 80	12 L. 35 K. 87
Calibre, in inches	12.01	12.01	9.45	9.45	9.45	7.5	5.91	5.87	5.87	4.72	4.72	4.72
{ Total, in feet	45.0	35.11	31.6	31.4	27.60	26.3	19.5	17.13	17.13	15.74	13.8	13.8
{ Rifled Portion, in ins.	319.7	314.8	291.3	286.2	237.7	239.7	182.6	151.4	153.6	147.6	128.5	126.3
Length { Powder Chamber in ins.	68.3	69.9	59.0	63.7	65.2	51.8	35.4	37.3	35.4	28.3	24.0	26.3
{ Of bore in calibres	45	35	40	40	35	42	40	35	35	40	35	35
No. of Grooves	92	68	72	72	25	56	44	36	36	36	32	36
Twist in calibres	40-25	45-25	..	..	26.9	11.6	..	45-25	25	25	25	25
{ Gun, tons	31.9	47.2	21.5	27.8	26.6	11.6	5.18	5.7	4.69	1.97	2.25	2.31
{ Breech Block, in lbs.	3450.2	3306.9	..	..	1776.9	..	..	445.3	463.0	..	253.5	211.6
{ Steel Shell	392	1003.1	474	474	474.0	198	112.5	112.5	86.0	52.4	57.3	57.3
Weight { Common Shell . . . . .	..	1003.1	474	474	474.0	..	112.5	112.5	69.9	52.4	57.3	57.3
{ Shrapnel Shell . . . . .	..	..	..	..	..	..	..	112.4	71.9	..	57.3	57.3
{ Case Shot . . . . .	..	..	..	..	..	..	..	..	..	..	..	..
{ Steel Shell . . . . .	..	10.6	..	..	5.1	..	..	1.3	1.76	..	0.55	0.55
{ Common Shell . . . . .	..	97.7	..	..	17.9	..	..	5.29	3.86	..	2.2	2.2
{ Shrapnel Shell . . . . .	..	..	..	..	..	..	..	1.26	1.10	..	0.57	0.57
Weight { Steel Projectile, in lbs. . . . .	..	156.5	120.6	91.5	99.2N	56N	28.8	22.5	38.8*	9.7	19.8B	12.13N
{ Common Shell, in lbs. . . . .	..	156.5N	91.5	91.5	99.2N	..	..	15 cm.N	38.8*	..	19.8B	12.13N
{ Shrapnel, in lbs. . . . .	..	24 cm.N	..	..	..	..	..	15 cm.N	..	..	..	..
Weight { Shrapnel, in lbs. . . . .	..	154.3B	..	..	..	..	..	28.7	19.6	..	11.0	6.6N
{ Exercising, in lbs. . . . .	..	19.8O	..	..	15.4O	..	..	4.74	4.74O	..	2.4O	2.4O
{ Saluting . . . . .	..	..	..	..	..	..	..	..	..	..	..	..
Muzzle Velocity, in feet	2625	1969	2535	2264	2100	2700	2608	2193	1969	2264	1755	2133
Muzzle { Total, foot-tons	47,402	26,970	22,121	16,845	14,500	10,025	5308	3549	2312	3554	1215	1808
Energy { Per inch circumference, foot-tons . . . . .	..	714.8	..	..	488.3	..	..	192.5	125.4	..	82.5	122.2
Thickness of Iron, perforated inches at Muzzle, by Tresidder's formula . . . . .	..	30.1	34.5	29.0	25.8	27.3	22.0	16.1	12.6	13.7	9.7	12.9
Perforation of Krupp Steel, 3000 yds., inches	..	10	9½	8	7	6½	5	3½	..	..	..	..

NOTE.—C for cube powder; * prismatic powder; B, brown prismatic. N, nitro-glycerine smokeless powder.
There are other types of Krupp guns, also Skoda 7-cm., Skoda and Hotchkiss 47-mm., and Hotchkiss 37-mm.

DANISH NAVAL ORDNANCE.

Designation by Calibre, in centimètres, length, in calibres, and type of gun	26 L. 35 (Krupp)	24 L. 40 1893 Krupp.	24 L. 40 1896 Canet.	24 L. 43 1901 Bofors.	24 L. 43 1905 Bofors.	21 L. 35 1888 Krupp.	15 L. 35 1896 Krupp. Bofors.	15 L. 43 1901 Bofors.	15 L. 43 1905 Bofors.	12 L. 40 Krupp.	8.7 L. 40	7.5 L. 55 Danish semi-aut.	5.7 L. 44 Hotchkiss.	4.7 L. 41 Hotchkiss.	4.7 L. 50 Danish semi-aut.
Calibre, in inches	10.24	9.45	9.45	9.45	9.45	8.24	5.87	5.87	5.87	4.72	3.43	2.95	2.24	1.85	1.85
Total length, in feet	29.86	31.50	31.50	33.86	33.86	24.05	17.12	21.17	21.17	15.75	11.41	13.53	8.13	6.72	7.71
Length of Bore, including { in inches Powder Chamber { in calibres	327.6	349.7	358.5	397.0	397.0	264.5	189.0	244.0	247.4	176.4	126.8	152.6	89.8	74.1	87.6
Number of Grooves	32.0	37.0	37.9	42.0	42.0	32.1	32.2	41.6	42.1	37.3	37.0	51.7	40.0	40.0	47.3
Twist of Rifling, in calibres	60	72	60	60	60	48	36	44	44	36	32	28	24	20	20
Total weight, including Breech-gear, tons	70-25	00-25	72-33	72-33	72-33	50-25	70-25	70-30	70-30	42-25	45-20	30	180-30	25	40-25
Breech Block, tons	27.3	25.4	22.9	24.3	24.5	13.3	4.7	5.5	5.5	2.26	1.13	0.87	0.36	0.23	0.32
Weight of { Armour-piercing Projectile, lbs. " Shell "	2006	1891	871	851	802	904	390	295	252	205	136	83	60	40	40
Common Shell, lbs.	452	353	353	353	353	238	112	112	112	..	..	..	..	..	..
Weight of { Armour-piercing Shell, lbs. Bursting Charge { Common Shell, lbs.	29.8	24.9	24.9	21.4	21.4	16.5	7.2	7.2	7.2	44	20	15	6	3.3	3.3
Weight of Firing Charge, lbs.	191.8	91.5	77.2	83.8	97.0	105.8	41.9	22.0	22.5	11.3	4.7	4.0	1.3	1.1	1.4
Muzzle Velocity, feet	2018	2362	2362	2477	2641	2018	1854	2297	2297	2362	2362	2625	2297	2346	2723
Muzzle { Total foot-tons Energy { Per inch circumference, foot-tons	12750	13640	13640	15000	17080	6712	2678	4100	4100	1702	767	737	218	126	170
Perforation at Muzzle, wrought iron, Tresidder's formula, inches	396.4	459.5	459.5	505.4	574.7	259.3	145.2	222.4	222.4	114.8	71.2	79.5	31.0	21.7	29.3
Perforation Krupp Steel, 3000 yards, inches	22.8	26.6	26.6	28.6	31.5	18.5	13.2	18.3	18.3	13.3	10.5	11.7	6.8	5.8	7.2
	6.2	9.1	9.1	9.8	10.7	4.2	3.3	6.2	6.2	..	..	..	..	..	..

There are also some older 1.46-inch, 1-pr. Hotchkiss guns.

DUTCH NAVAL ORDNANCE.

	Krupp Breech Loading Q.F.										Dutch Breech Loading.
	28	24	21	21	21	No. 2	15	15	12	12	
Designation by Calibre, in centimètres . . .	.	.	.	.	.	.	.	.	.	.	121
Calibre, in inches	11.0	9.4	7.91	8.2	8.2	5.87	5.9	5.9	4.72	4.72	4.72
Total Length, in feet	27.5	31.6	24.04	24.0	27.5	17.13	17.1	19.7	13.9	13.78	13.78
Length of Rifled Portion of Bore, in inches . . .	.	.	222.2	.	.	151.4	.	.	.	128.5	.
Length of Powder Chamber . . . . .	.	.	42.4	.	.	37.7	.	.	.	24.0	.
Length of Bore, in Calibres	27	37	35	32	37.1	35	32	37	32.3	35	35
Number of Grooves . . . . .	.	.	48	.	.	44	.	.	.	32	32
Depth of Grooves, inches . . . . .	.	.	0.059	.	.	.	.	.	.	.	0.06
Twist of Rifling, in Calibres . . . . .	.	.	α-25	.	.	25	.	.	.	25	α-45
Total Weight, in tons	27	25.3	13.79	14.0	16.2	4.72	3.8	4.7	1.9	2.26	2.31
Firing Charge { Armour-piercing Projectile, in lbs. . .	185	.	98.2	119	.	49.6	15.4	18.5	.	19.8	19.5
Common Shell . . . . .	.	.	99.2	.	.	49.6	.	.	.	19.8	19.8
Armour-piercing Projectile "	761	474	308.6	309	309	112.2	100	88.2	52.4	57.3	57.3
Common Shell . . . . .	.	.	308.6	.	.	112.2	.	.	.	57.3	57.3
Case Shot . . . . .	.	.	.	.	.	.	.	.	.	57.3	.
Bursting Charge { Armour-piercing Projectile " . . .	.	.	4.6	.	.	.	.	.	.	.	.
Common Shell	20	.	12.3	.	.	.	.	.	.	.	.
Muzzle Velocity, feet	1627	2562	1789	1903	2067	2001	2034	2461	2034	1755	1804
Muzzle { Total, in foot-tons	13,960	21,589	6471	7760	9756	3115	2867	3703	1503	1689	1264
Energy { Per inch Circumference, foot-tons . . .	.	.	260.7	.	.	169.0	.	.	.	82.5	85.2
Perforation at Muzzle, in inches	20.0	34.0	16.8	19.4	21.9	13.6	14.3	17.9	11.6	9.4	9.6
Perforation Krupp Steel, 3000 yards	5½	9½	17.1	4½	5	14.8	.	.	12.4	10.1	.

FRENCH NAVAL ORDNANCE.

Date and Pattern of Gun.	Model 1902.	Model 1893-96.				Model 1893.				Model 1887.				1884.				1881.							
		30-5	30-5	27-44	24-0	19-4	34-0*	30-5	27-44	24-0	19-4	34	30-5	27	19	34	27	24	16	14	34 long.	34 short.	27	24	16 heavy.	16 light.
Design, by Calibre, in cms.	30-5	30-5	27-44	24-0	19-4	34-0*	30-5	27-44	24-0	19-4	34	30-5	27	19	34	27	24	16	14	34 long.	34 short.	27	24	16 heavy.	16 light.
Calibre, in inches .	12-01	12-01	10-8	9-45	7-64	13-39	12-0	10-8	9-45	7-64	13-39	12-0	10-80	7-64	13-39	10-80	9-45	6-49	5-45	13-39	13-39	10-8	9-45	6-49	6-49
Total length, in feet .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	28-47	24-80	17-04	..	33-69	25-32	27-12	23-70	15-14	15-14
Length of Bore, in ins. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	380-6	280-2	306-9	269-3	180-9	180-9
Length of Bore, in cals.	45	40	40	45	35	40	40	40	40	40	42	45	45	45	30	30	30	30	30	28-5	21-0	28-5	28-5	28	28
Number of Grooves .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	50	42
Depth of Grooves, inches	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0-067	0-067	0-059	0-055	0-039	0-035
Rifling Twist .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	7°	7°	7°	7°	7°	7°
Total weight, in tons .	..	44-4	34-5	23-6	12-5	52-9	45-9	34-9	22-4	10-6	60-0	49-2	37-1	10-6	50-8	27-7	17-9	5-4	3-15	52-2	47-2	27-4	17-7	4-9	3-9
Weight of Armour - piercing Projectile, lbs.	..	246	188-5	145½	74	243-0	198-4	114-6	110-2	44-1	220-5	198-4	114-6	44-1	388-0	200-6	..	42-5	..	388-0	337-3	203-9	149-9	42-5	32-6
Firing Charge	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	200-6	..	42-5	27-1	337-3	368-2	203-9	149-9	42-5	32-6
Weight of Armour-piercing Projectile lbs.	750	562	375	190	925-9	643-8	476-2	317-5	165-3	925-9	643-8	476-2	165-3	165-3	925-9	476-2	317-5	599-2	..	925-9	925-9	476-2	317-5	99-2	99-2
Weight of Com. Shell "	..	750	562	375	190	925-9	643-8	476-2	317-5	165-3	925-9	643-8	476-2	165-3	771-6	6396-8	264-6	99-2	66-1	771-6	6771-6	396-8	264-6	99-2	99-2
Muzzle Velocity, in f.s., A.P. Projectile . . .	2870	2650	2650	2870	2400	2625	2625	2625	2625	2625	2560	2625	2625	2625	1969	1969	1969	1969	1969	1969	1804	1969	1969	1969	1821
Muzzle (Total, in f.t. . . .	42890	36782	27186	21445	10890	36850	30750	22750	15170	7898	42040	30750	22750	7898	24900	12800	8589	2668	1777	24900	20880	12800	8539	2668	2080
Energy Per in. circ., f.t.	..	..	..	..	..	..	815-8	670-7	511-1	329-1	..	815-8	670-7	329-1	591-9	377-5	287-7	130-8	103-9	591-9	496-6	377-5	287-7	130-9	121-3
Perforation at Muzzle† wrought iron, inches.	46-0	42-7	38-8	37-0	29-0	36-8	37-3	33-7	29-4	23-4	40-8	37-3	33-7	23-4	27-6	22-0	19-2	13-0	10-7	27-6	24-2	22-0	19-2	13-0	11-6
Perforation Krupp Steel 3,000 yds.	15½	13½	11½	10½	6½	11½	11	9	7½	5½	13	11	9	5½	7½	6	5½	3	..	7½	7	6	5½	3	..

* For special purposes.

† By Trevidder's formula.

A new type of the 1902 Model has been tried with 7-0-in. and 6-4-in. calibre. There will probably be replaced by model of 1906, 12-in. 970 lb. projectile, velocity 2840 f.s., and 9-4-in. 220 lb. projectile, velocity 2840 f.s.

FRENCH NAVAL ORDNANCE—continued.

Date and Pattern of Gun.	16-47.*	Q.F. Guns.						
		Mod. 93-6. 16-47	16‡	16‡	14‡	Mod. 92. 10	Mod. 91. 10	Mod. 81. 10‡
Desig. by Calibre, in cms.	16-47		16-47		13-86		10-00	
Calibre, in inches	6-46		6-46		5-44		3-94	
Total length, in feet	26-9							
Length of Bore, in inches . . . . .	..						
Length of Bore, in calibres	47-5	45	45	30	45	55	45	26
Number of Grooves . . . . .	..						
Depth of Grooves, inches . . . . .	..						
Rifling Twist . . . . .	..						
Total weight, in tons	8-5	8-1	6-89	4-92	4-13	3-84	1-62	1-18
Weight of { Armour-piercing Projectile . . . lbs.	..	44	30-2	19-0	16-1	12-8	8-16	5-07
Firing Charge { Common Shell . . . . .	..						
Weight { Armour-piercing Projectile . . . lbs.	115	115	99-21		66-14		30-87	
Common Shell . . . . .	..	115	99-21		66-14		30-87	
Muzzle Velocity, in ft.-secs.	3110	2870	2625	2100	2625	2100	2428	1840
Muzzle { Total, in foot-tons	7185	6568	4780	3061	3160	2022	1266	725
Energy { Per in. circ. foot-tons . . . . .	..	..	233-5	150-9	184-9	118-7	..	..
Perforation at Muzzle, wrought iron, inches . . .	26-3	24-5†	20-0†	14-4†	17-7†	12-7†	13-0†	8-2†
Perforation Krupp steel, 3,000 yards	5‡	5‡	4	..	..	..	..	..

* Experimental gun not in service.

† By Trevidder's formula.

‡ There are three models of the years 1887, 1891 and 1893, of slightly different weights from the above.

† Models 1881 and 1884 converted guns.

ITALIAN NAVAL ORDNANCE.

Designation by Calibre, in centimètres .	43·1†	Armstrong Breech Loading.				Q.F.	Armstrong B.L.		Armstrong Quick-Firing.				
		43·1† Early Pattern. 1882.	34·3	30·5	25·4		15·2	15·2	15·2	15·2	12·0	12·0	7·6
Calibre, in inches	17						6	6	6	6	4·7	4·7	3·0
Length { Total, in feet	40·75	39	36·09	12	10	8	16·9	17·0	20·9	20·9	16·2	13·0	..
{ Rifled Bore, in inches	346·8	315·7	..	..	..	..	..	..	..	..	189 {	..	..
{ Powder Chamber, in inches	84·5	98	..	..	..	..	..	..	..	..	..	..	..
{ Bore, in Calibres	27	26	..	40	40	45	82	83·0	40	40	40	35	40
No. of Grooves	82	82	56	..	..	..	..	..	..	..	22	22	..
Twist of Rifling, in Calibres	50	50	..	..	..	..	..	..	..	..	34·4	..	..
Total Weight, in tons	104·3	101·5	67·9	..	30	..	5·4	5·1	5·7	6·5	2·05	1·69	0·6
Firing Charge { Armour-piercing projectile, lbs.	900·0	725	630·5	..	..	..	46	46	46	17·6*	..	..	..
{ Common Shell,	600	480	..	..	..	..	..	..	..	..	..	..	..
{ Armour-piercing projectile, "	2000	2000	1250	850	448	250	98	98	100	100	45·0	36·0	12
Weight { Common Shell,	2000	2000	1250	..	..	..	..	..	..	..	..	36·2	..
{ Shrapnel "	2017	2017	1250	..	..	..	..	..	..	..	..	29·8	..
{ Case Shot . . . . .	..	..	..	..	..	..	..	..	..	..	..	..	..
Bursting Charge { Armour-piercing projectile, "	32	32	17·4	..	..	..	2·0	2·0	5·1	4·4	..	1·88	..
{ Common Shell,	60	60	87·1	..	..	..	..	..	..	..	..	3·02	..
{ Shrapnel "	5	5	4·25	..	..	..	..	..	..	..	..	0·85	..
Muzzle Velocity, in ft.-secs.	1992	1935	2016	2500	2460	2600	1952	1985	2149	2297	2180	..	2625
Muzzle Energy { Total, foot-tons	55,030	51,930	35,230	36,925	18,798	11,730	2577	2705	3169	3822	1490	..	573
{ Per inch circumference, foot-tons	1035	976·3	830·8	..	..	..	..	..	..	..	..	..	..
Perforation at Muzzle, inches of iron by { Treasider's formula	36·7	35·0	33·0	40·0	31·0	28·3	13·2	13·6	15·4	17·0	12·4	..	10·2
Perforation Krupp Steel, 3000 yds., inches	12½	12	11	13	9	7	..	..	..	3½	..	..	..

* Ballistite.

† There are four types of these guns, viz.—Lauria, Lepanto, Italia, Morosini.

N.B.—There is also a 6-inch quick-firing gun, 40 cal. M.V., 2800 f.s.

The weight of Ballistite charges is not known, but it is understood that they give the same ballistics as the powder charges shown.

NAVAL ORDNANCE OF NORWAY.

Modern Guns.									
Designation by Calibre, in cms.	21	21 Q.F.	15	15 Q.F.	12 Q.F.	76 mm.	76 mm.	76 mm.	7 cm.
Calibre, inches	8.24	8.24	5.87	5.87	4.7	3.0	3.0	3.0	2.8
Total Length, feet	24.2	31.2	19.6	23.2	17.7	10.3	13.3	13.3	9.2
Length { Rifled Portion of Bore, inches	212.3	309.7	148.2	234.2	179.2	102.7	127.7	127.7	81.8
	52.5	52.6	37	34.6	28.2	17.6	22.3	22.3	19.1
Length { Chamber, inches	32.1	43.8	37.1	45.8	43.9	40	50	50	37
	Bore in calibres, inches.								
Number of Grooves	64	32	44	28	26	16	28	28	28
Twist of Rifling	46-23	α-30	45-25	α-30	α-30	α-30	30	30	20
Total Weight, tons	13.9	18.7	5.6	7.0	2.65	0.6	1.0	1.0	0.63
Weight of { Armour-piercing Shell, in lbs.	309	309	112	99.3	45	12.5	12.5	12.5	10.5
	Common Shell, in lbs.								
Weight of { Common Shell, in lbs. . . . .	..	309	..	..	..	..	..	..	..
	119	58*	20.4	24.8	10.1	2.2	3.75	3.75	2.2
Firing Charge { Armour-piercing Shell, in lbs. . . . .	..	58	..	..	..	..	..	..	..
	Common Shell, in lbs.								
Muzzle Velocity, feet	1903	2300	2070	2625	2570	2200	2840	2840	2220
Muzzle Energy, Total foot-tons	7760	11200	3328	4870	2060	419	695	695	357
Perforation through Iron by Tresidder's formula	19.2	25.6	15.6	21	15.8	8.0	11.6	11.6	7.8
Perforation, Krupp Steel, 3000 yards	4½	6½	..	5	..	..	..	..	..

* Smokeless powder.

RUSSIAN NAVAL ORDNANCE.

NEW PATTERN RUSSIAN NAVAL GUNS.									
The following guns are in use in the Russian Navy, the ballistics being somewhat as under :—									
Steel B.L. Guns.									
Obukhoff Steel Breech Loading Hooped Guns.									
Designation by Calibre, in inches	12	9	8	6	4.2	3.43	3.43	3.43	3.43
Calibre in centimètres	30.48	22.86	20.32	15.24	10.67	8.70	8.70	8.70	8.70
Total Length, in feet	55	26.25	23.33	17.5	7.0	6.9	5.8	5.8	5.8
Length of Rifled Portion of Bore, in inches	..	..	..	..	65.0	62.6	53.0	53.0	53.0
Length of Powder Chamber, in inches	..	..	..	..	8.0	10.7	..	..	..
Length of Bore in Calibres, including Powder Chamber	31.9	35	35	35	17.4	21.4	..	..	..
Number of Grooves	..	..	..	..	16	24	12	12	12
Depth of Grooves in ins.	..	..	..	..	0.055	0.050	0.050	0.050	0.050
Twist of Rifling in cal.	..	..	..	..	50	40	41	41	41
Total Weight, in tons	55.7	19.44	13.64	6.26	0.87	0.45	0.35	0.35	0.35
Weight of (Steel Shell, in lbsa. Chilled Shell, " " " " " " Common Shell, " " " " " " Case Shot, " " " " " "	731	..	..	..	..	..	..	..	..
Weight of (Steel Shell, in lbsa. Chilled Shell, " " " " " " Common Shell, " " " " " " Case Shot, " " " " " "	338	..	..	..	..	..	..	..	..
Muzzle Velocity, in feet	2090	2376	1925	2080	..	..	..	..	..
Muzzle (Total foot-tons Energy { Per Inch Circumference, Foot-tons	22130	10,500	..	2682	..	..	..	..	..
Perforation at Muzzle, in inches	587.1	371.4	..	142.3	..	..	..	..	..
Perforation at Muzzle, by Tresidder's formula	..	20.2	..	12.50	..	..	..	..	..
Perforation at Muzzle, by Tresidder's formula	28.3	24.0	15.7	..	..	..	..	..	..
Perforation Krupp Steel, 3000 yds., inches	8	6	..	..	..	..	..	..	..

There exist also 15 and 10.7 cm. Krupp guns.

Designation by Calibre Calibre, in inches (Total length, in feet Length of Rifled Portion, in inches Powder Chamber, in inches Bore, in calibres No. of Grooves . . . Depth of Grooves, in ins. Twist of Rifling, in cals. Total Weight, in tons Armour-piercing projectile, in lbs. Weight of (Common Shell, in lbs. Ring Segment, in lbs. Firing Charge Muzzle Velocity, in feet Muzzle Energy Penetration at Muzzle, in inches Performance Krupp's 3000 yards	Hontoria, Pattern 83.					Armstrong, Pattern 83.			Armstrong.		Krupp.								
	Breach Loading.								Muzzle Loading.	Pattern. R.L.	Q.F. guns.								
	32-cm.	28-cm.	24-cm.	20-cm.	18-cm.	16-cm.	14-cm.	12-cm.	8.7-cm.	7.5-cm. long.	22.86-cm.	20.3-cm.	6-in.	15-cm.	12-cm.	14-cm.	75-mm.	57-mm.	47-mm.
	12.60	11.02	9.45	7.87	7.00	6.34	5.51	4.72	3.4	2.95	9.00	8.00	6.00	5.9	4.72	5.51	2.95	2.24	.85
	38.7	33.8	29.0	..	21.75	19.3	16.91	14.5	7.9	7.50	13.0	11.0	14.5	19.6	17.13	20.7	..	..	..
	352.4	309.1	..	..	..	170.6	149.1	126.0	75.0	70.7	104.0	102.0	126.9	..	..	..	..	..	..
	86.8	77.1	..	..	..	49.8	53.9	39.4	13	13	..	..	29.7	..	..	..	..	..	..
	35	35	30	..	30	35	35	35	27	28.7	14	14.75	26.1	35	30	45	40	42	40
	80	70	60	50	45	40	35	30	20	18	6	4	28	36	32	..	..	..	..
	0.06	0.06	0.05	0.06	0.04	0.04	0.04	0.04	0.03	0.03	0.18	0.18	..	0.06	0.06	..	..	..	..
	From 0 to 30.					40	30	35	45	40	100	25	25	..	..	..	..	..	..
	47.3	32.5	20.7	11.5	8.71	6.1	4.1	2.6	0.45	0.35	12.0	9.0	4.0	4.7	2.1	4.39	0.9	0.34	0.23
	1041	694	3438	7253	5187	4130	186	53.1	..	..	250.0	180.0	78.3	84.9	43.65	70	14	6	3.3
	879	6586	4370	4213	8	..	112	475	14.1	11.5	250.0	180.0	73.6	65.5	34.61	..	..	..	..
	886	3590	8370	4211	6	..	112	475	15.4	11.7	..	..	83.6	..	34.61	..	..	..	..
	485	0	352	7	220	5	112	4	..	..	50.0	35.0	34.0	37.48	19.29	..	7.1	1.93	..
	463	0	319	7	220	5	..	..	4.0	4.0	33.0	21.0	24.9	25.4	..	..	..	..	..
	2034	2034	2034	2034	2034	2054	2001	1988	1625	1709	1339	1929	2001	1887	2264	2460	2100	1870	2330
	29850	24030	12580	7271	5374	3806	2386	1511	253	233	3105	2239	2018	2337	3554	2936	428	145	124
	32.9	28.7	24.6	20.5	18.6	16.6	13.9	11.6	..	..	10.6	9.6	11.0	12.7	9.7	16.5	7.9	5.0	5.7
	11	8	6½	4½	4½	3½	..	..	..	..	..	..	..	..	..	..	..	..	..

Note.—The Carlos V. has 11-in. 45-cal. guns. M.V. probably 2500 f.m.

NAVAL ORDNANCE OF SWEDEN.

Armstrong	Canet.	Canet and Bofors.	Whit. worth.	Bofors.				Bofors.				Bofors and Fin.	Stockholms Vapenfabrik and Finspong.	Bofors.	Stockholms Vapenfabrik and Finspong.	Fin. spung.	Stockholms Vapenfabrik.		
				24 cm.k. m/96	24 cm.k. m/94	21 cm.k. m/98	15 cm.k. m/03	12 cm.k. m/03	12 cm.k. m/04	12 cm.k. m/03	7-5 cm.k. m/05							5-7 cm.k. m/89	5-7 cm.k. m/89 B	5-7 cm.k. m/92	5-7 cm.k. m/95 B	5-7 cm.k. m/95 C.	5-7 cm.k. m/95 D.	4-7 cm.k. m/95	3-7 cm.k. m/98	3-7 cm.k. m/98 B
25 cm.k. m/85 C.A.	25 cm.k. m/94 N.	25 cm.k. m/94 B.C. N.	24 cm.k. m/92 C.A.	24 cm.k. m/96 C.A.	24 cm.k. m/94 C.A.	21 cm.k. m/98 N.	15 cm.k. m/03 N.C.A.	12 cm.k. m/03 N.C.A.	12 cm.k. m/04 N.C.A.	12 cm.k. m/03 C.A.	7-5 cm.k. m/05 N.	5-7 cm.k. m/89 N.	5-7 cm.k. m/89 B N.C.A.	5-7 cm.k. m/92 N.	5-7 cm.k. m/95 B C.A.	5-7 cm.k. m/95 C. C.A.	5-7 cm.k. m/95 D. N.	4-7 cm.k. m/95 N.	3-7 cm.k. m/98 N.C.A.
25-4	25-4	25-4	24	24	24	21	15-24	12	12	12	6000	3070	2737	3108	2760	1478	1504	1200	2572
8036	8036	10670	8544	10320	12000	9335	6783	5400	5400	6000	3070	2737	3108	2760	1478	1504	1200	2572	1308
6743	6743	8498	6818	8541	10000-3	7801-1	5693	4665	4665	5013	3130	2146	2517-5	2328	1049-5	1049-5	1448	817-0	2034-5
1385	1385	1669	1373-1	1390-6	1508-4	1123	787-7	474	474	742	560-5	266	265	220	205	262	262	229	267
32	32	40-5	33-5	41	48	42-5	48	43	43	48	40	12	40	15	22	23	30	22	40
42	42	44	40	40	40	60	44	36	36	36	28	24	24	24	24	24	24	24	34
40	40	30	30	30	30	30	30	30	30	30	30	30	30	30	25	25	27	25	30
30-25	31-03	28-10	28-1	25	30-44	17-0	5-98	2-8	2-8	3-7	0-975	0-340	0-380	0-334	0-216	0-206	0-189	0-116	0-0675
204	204	204	215	215	215	125	45-4	21	21	21	—	—	—	—	—	—	—	—	—
182	182	182	215	215	215	125	—	21	21	21	6-5	2-72	2-722	2-722	2-722	2-722	2-722	1-5	0-8
110	46	45-2	36	43	56	30	1	4-15	4-15	6-75	—	—	—	—	—	—	—	1-5	0-8
82	67	—	—	—	—	30	10	4-15	4-15	6-75	1-7	0-42	0-435	0-34	0-24	0-24	0-35	0-3	0-08
610	720	720	615	685	775	750	750	740	740	800	780	000	704	640	485	485	000	488	550
4268	4268	5386	4209	5138	6582	3581	1301	580	580	791	202	00-4	08-7	54-8	32-64	32-64	40-95	10-73	12-3
38-8	38-8	45-9	44	52	—	34	20	—	—	—	—	—	—	—	—	—	—	41-80	12-3

UNITED STATES NAVAL ORDNANCE.

NATURE OF GUN.	Calibre.	Weight.	Total Length.	Total Length of Bore.	Length of Rifling.	Twist of Rifling.	Length of Chamber.	Weight of Service Charge.		Muzzle Velocity (Service).	Muzzle Energy.	Perforation of wrought iron at muzzle.	Perforation of Krupp steel at 3000 yds.
								Brown Powder.	Smokeless Powder.				
3-in. (14 pr.)	Inch. 3	tons. 0·87	feet. 12·5	Inch. 149·5	Inch. 125·5		Inch. 21·3	lbs. 5	lbs. 14	ft.-seconds. 3000	ft.-tons. 874	Inch. 13·5	Inch. ..
4-in. Q.F., Mark I.	4	1·5	13·7	157·3	130·3	zero to 1 in 25	24·7	12 to 14	33	2000	915	9·8	..
4-in. Q.F. Gun	4	1·5	13·7	157·5	128·1	..	25·4	..	33	2000	..	9·8	..
4-in. Q.F., Mark VII., of 50 Cals.	4	2·56	17·0	200·0	168·4	..	31·6	..	32	2900	1,999	16·9	..
5-in. Q.F., Mark I.	5	2·8	18·5	150·3	120·8	{ 1 in 180 to 1 in 30 }	27·1	26 to 29	60	2000	1,660	11·8	..
5-in. Q.F. Gun	5	3·1	17·4	191·5	164·4	zero to 1 in 25	32·0	28 to 30	50	2300	1,834	13·2	..
5-in. Q.F., Mark V.	5	4·46	21·3	250	212·9	..	37·2	..	60	2900	3,503	20·5	4½
6-in. B.L.R., Mark I.	6	4·8	15·8	176·0	136·7	{ 1 in 180 to 1 in 30 }	36·9	50	100	2000	2,773	..	..
6-in. B.L.R., Mark II.	6	4·9	16·1	180·1	144·9	..	32·7	45 to 48	100	2000	..	18·8	..
6-in. B.L.R., Mark III., of 30 Cals.	6	4·8	16·3	183·8	147·3	zero to 1 in 25	34·0	44 to 47	100	2000	2,990	14·7	..
6-in. B.L.R., Mark III., of 35 Cals.	6	5·2	18·8	213·8	177·3	..	34·0	..	100	2080	3,204	15·4	..
6-in. B.L.R., Mark III., of 40 Cals.	6	6·0	21·3	243·8	207·3	..	37·0	..	100	2150	3,200	15·4	..
6-in. Q.F. Gun	6	6·0	21·3	243·8	204·3	..	37·0	44 to 47	100	2150	3,200	15·4	..
6-in. Q.F., Mark VI.	6	8·17	25·0	293·7	245·3	..	48·4	..	100	2900	5,838	24·2	5
7-in. Q.F.	7	..	..	..	..	{ 1 in 180 to 1 in 30 }	..	..	165	2900	9,646	28·7	6½
8-in. B.L.R., Mark I.	8	{ 12·3 } { 12·9 }	21·5	239·9	195·2	..	42·1	105 to 115	{ 250 } { 250 }	2000	6,932	19·0	4½
8-in. B.L.R., Mark II.	8	13·0	21·5	239·9	195·2	..	42·1	..	250	2080	7,498	19·0	4½
8-in. B.L.R., Mark III., of 35 Cals.	8	13·1	25·4	290·5	242·8	zero to 1 in 25	45·1	..	250	2150	8,011	21·1	5
8-in. B.L.R., Mark III., of 40 Cals.	8	15·2	28·7	330·5	282·8	..	45·1	..	250	2150	13,602	31·4	8
8-in. B.L.R., Mark V., of 45 Cals.	8	18·0	28·6	335·0	271·0	..	64·0	..	250	2800	13,602	31·4	8
10-in. B.L.R., Mark I., of 30 Cals.	10	25·7	27·4	306·3	247·3	{ 1 in 180 to 1 in 35 }	57·2	225 to 240	500	2000	13,864	24·0	6½
10-in. B.L.R., Mark I., of 35 Cals.	10	{ 27·1 } { 28·2 }	30·5	343·8	283·7	zero to 1 in 25	57·2	..	500	2060	14,709	25·0	6½
10-in. B.L.R., Mark II., of 30 Cals.	10	25·1	27·4	307·3	247·3	{ zero to 1 in 26·8 }	57·2	..	500	2000	13,864	24·0	6½
10-in. B.L.R., Mark II., of 35 Cals.	10	27·6	31·2	354·9	294·9	zero to 1 in 25	57·2	..	500	2100	15,285	25·8	7
10-in. B.L.R., Mark III., of 40 Cals.	10	33·4	33·3	389·0	313·4	..	75·6	..	500	2800	27,204	42·0	12
12-in. B.L.R., Mark I.	12	45·2	36·8	419·2	343·1	..	74·1	425	850	2100	25,985	30·8	9
12-in. B.L.R., Mark III., of 40 Cals.	12	52	41·8	480·1	388·1	..	81·9	..	850	2800	46,246	47·2	16
13-in. B.L.R., Mark I. and II.	13	60·5	40·0	454·5	370·5	..	80·9	230	1100	2100	33,627	33·5	11

NOTE.—The weight of fixed ammunition for Q.F. 4-in. and 5-in. guns is 58 and 98 lbs. respectively.

† By Tresidder's formula.

ELSWICK GUNS.

This Table is supplied by the Manufacturers.

[illegible]

SOME RESULTS ACTUALLY OBTAINED UNDER SERVICE CONDITIONS AT A TARGET.

2.2-in. gun—8 rounds in 2 minutes 10 seconds from 1 turret (pair of guns); 16 rounds in 2 minutes 45 seconds from two turrets (four guns).

9-2-in. gun—57 rounds in 2 minutes from six guns; 44 rounds in 2 minutes from six guns; 13 rounds in 2 minutes from two guns.

7.5-in. gun—38 rounds in 1 minute 45 seconds from four guns; 35 rounds in 1 minute 45 seconds from four guns.

4.0 seconds from 1001 guns.
3.5-in. gun—74 rounds in 1 minute from 10 guns; 78 rounds in 1 minute from ten guns.
1.7-in. gun—70 rounds in 1 minute from eight guns.

1. 7-in. gun—79 rounds in 1 minute from eight guns.
4-in. gun—59 rounds in 45 seconds from eight guns.

12 pr. gun—10 rounds in 31 seconds from one gun.

Diameter of Bore, ins.	7.5	8	8	8	8	8-24	9-2	9-2	10	10	10	12	12	12	12
do. do. mm.	180	203	203	210	224	224	234	234	254	254	254	305	305	305	305
Length of Bore, cal.	50	45	50	44	45	45	50	40	45	50	40	40	45	50	50
tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons
Weight of Gun ...	15	18-0	21	18-1	36-75	28	31	36-25	35	48-5	51	59-3	69-0	69-0	69-0
do. Projectile, lbs.	200	250	250	308-6	380	380	450	500	500	500	850	850	850	850	850
do. Cordite Charge	lb.	lb.	lb.	lb.	lb.	lb.	81-5	...	...	...	141	...	...	lb.	lb.
do. M.D. do.	...	...	...	...	...	...	86-5	167	180	185	260	260	260	260	318
Muzzle Velocity, f.s.	2350	2800	2850	2300	2750	3000	2400	2800	2900	2400	2650	2800	2960	2960	2960
Muzzle Energy, f.t.	12068	10872	12069	11320	18926	23712	17072	27181	29167	33949	41366	46208	51640	51640	51640
Penetration of Muscle,	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
ins. ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Rotations per Minute	6	5	5	5	4	4	3	...	...	...	...	...	...	...	...

This Table is supplied by the Manufacturers.

Gun.		37 mm. 30 cal.	37 mm. 42.5 cal.	3-pdr. 50 cal.	3-pdr. 50 cal.	3-pdr. 50 cal.	3-pdr. 50 cal.	3-in. Semi-Aut. 50 cal.	4-in. 50 cal.	4.33-in. Howitz. zer. 13.5 cal.	4.7-in. 45 cal.	4.7-in. 45 cal.	4.7-in. 14 cm. 48 cal.	6-in. 45 cal.	6-in. 50 cal.	7.5-in. 45 cal.	7.5-in. 50 cal.	8-in. 48 cal.	9.2-in. 47 cal.	9.2-in. 50 cal.	10-in. 45 cal.	10-in. 48 cal.	12-in. 50 cal.
Diameter of Bore	. ins.	1.457	1.457	1.85	2.244	3	3	2.95	3	4	4.33	4.724	4.724	5.512	6	6	7.5	7.5	8	9.2	10	10	12
Length of Bore	. ins.	43.5	63	92.5	112.2	42.84	64.96	87.65	150	201.15	212.6	228.45	228.45	248	269.5	300	337.5	388.75	429.3	460	450	486	600
Length of Gun	. ins.	73.75	94	98.9	118.6	47.23	69.3	91.9	156.995	208.45	220	236.2	257.7	279.2	310.07	349.2	386.7	400	442.35	473	464.6	500	557.55
Maximum pressure in Chamber, tons per sq. in.		13	14	17	16	12	16	13.5	17	18	12.5	17	18	16.5	17.75	18	18	17.5	18	18	18	18	18.5
Weight of Charge	lbs.	.0782	.1875	1.066	1.55	.5	1	1.23	3.625	11.25	1.0	19	17	21.875	35.25	43	78.25	80.03	90	170.5	184	190.5	344
Weight of Projectile	lbs.	1	1.25	3.3	6	12.5	12.5	14.3	12.5	31	35.27	45	45.14	88.19	100	100	200	216.7	380	380	478.4	496.6	850
Weight of Gun	. . .	3 2 24	5 1 19	5 2 4	9 1 5	2 1 23	2 0 8	15 19	0 2 1 3	7 1 3	3 3 3	3 3 3	3 2 0	5 18	0 7 8	2 7 16	0 14 0	2 16 0	14 3	0 28 1	0 27 16	34 17	0 27 17
Muzzle Velocity	. f.s.	1800	2300	2800	2600	1150	1600	1706	2700	3030	1045	2925	3050	2860	3012	3190	2875	3007	3090	3025	3070	2850	2863
Muzzle Energy	. f.t.	22.5	45.85	179.4	281	115	220	289.2	632	1975	267	2670	2910	4990	6290	7056	11465	12540	14350	24110	24835	26945	28225
Penetration of Wrought Iron Plate at Muzzle.		1.9	3.3	6.7	7.5	..	..	..	9.65	16.0	..	16.65	17.8	22.1	23.65	25.8	28.75	30.75	31.5	39.25	39.95	40.2	50.65
Penetration of Mild Steel Plate at Muzzle. Gavre formula . . . ins.		1.5	2.6	5.1	5.4	..	..	..	7.5	12.4	..	12.9	13.8	17.1	18.4	20	22.25	23.7	24.4	30.45	31.0	30.1	31.15
Penetration of Hard Steel Plate at 3000 yards. Gavre formula . . . ins.		..	..	..	..	..	..	..	..	..	..	..	4.5	6.2	6.3	7.2	8.9	9.35	9.8	13.35	13.75	13.8	14.65
Rounds per minute	. . .	300	300	30	28	20	20	20	25	15	..	12	12	10	10	10	8	8	6	4	4	3	2
Weight of Mounting complete with Shield	. . .	4 1 10	3 2 5	11 3 0	14 2 0	7 3 0	11 2 0	17 2 0	1 2 0	2 0 1	3 0 3	13 0 5	2 0 9	2 0 1	17 3 0	3 13	3 13	3 13	3 13	3 13	3 13	3 13	3 13
Thickness of Shield	. ins.	4	10	25	no	1	1	1.25	no	no	no	2 8	3 13	3	3	3	3	3	3	3	3	3	3
Weight of Shield	. . .	3 11	q. l.	q. l.	q. l.	q. l.	q. l.	q. l.	q. l.	q. l.	q. l.	q. l.	q. l.	q. l.	q. l.	q. l.	q. l.	q. l.	q. l.	q. l.	q. l.	q. l.	q. l.
Angle of Elevation	. . .	16°	13°	20°	20°	25°	16°	16°	20°	15°	50°	20°	20°	20°	20°	20°	20°	20°	20°	20°	20°	20°	20°
Angle of Depression	. . .	25°	25°	20°	10°	15°	6°	8°	10°	10°	5°	7°	10°	10°	10°	10°	8°	8°	6°	4°	3°	2°	2°

Depending on type of Mounting used.

SCHNEIDER GUNS.

The information in this Table is given by the Manufacturers.

Calibre, in millimètres.	305	274.4	210	210	200	175	150	120	100	75	65	57	47	37
Calibre, in inches .	12.0	10.9	8.3	8.3	7.9	6.9	5.9	4.7	3.9	2.9	2.5	2.2	1.8	1.4
Length, in calibres .	45	50	45	50	45	45	45	50	45	50	60	50	60	60
Weight, in tons .	52.9	38.5	17.3	18.6	14.9	10.0	6.3	3.2	1.9	.85	.55	.45	.30	.17
Weight of A.P. Projectile, lbs.	826	606	275	275	231	165	99	48	28	14.3	8.8	6	3	1.76
Weight of Charge .	Not stated.													
Muzzle Velocity, ft.-secs.	2952	3116	2952	3116	2952	2652	2652	2952	3116	2871	3035	2952	3116	3116
Muzzle Energy, ft.-tons	50007	36670	16667	18572	14002	10000	6001	2932	1734	820	917	533	362	119
Perforation of Steel at muzzle (ins.) .	38.3	37.4	26.2	28.3	24.3	22.1	18.2	13.9	11.6	10.7	9.1	7.1	5.9	5.0
Perforation of Steel at 3000 yards (ins.) .	29.3	27.8	17.5	19.2	16.1	13.8	10.2	6.4	4.9	..	..	..	..	..

KRUPP GUNS. **Tables supplied by Manufacturers.** **NAVAL GUNS.**

Calibre, in centimetres.	7.5	10.5	12	15	21	24	28	30.5
Calibre, in inches.	2.95	4.13	4.72	5.91	8.27	9.45	11.02	12.01
Total Length of Gun, in cal.	40	45	40	45	50	40	45	50
Length of Bore, in inches.	9.84	11.07	12.30	13.78	15.5	17.22	18.77	20.49
Weight of Gun, in lbs.	108.66	123.43	138.19	153.55	174.21	194.89	219.52	244.49
Weight of Gun, in tons.	14.88	17.11	19.36	21.1	24.5	27.9	31.4	35.4
Weight of Steel Projectile, in lbs.	0.66	0.86	1.07	1.27	1.43	1.61	1.81	2.01
Weight of Charge, in lbs.	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
Muzzle Velocity, in ft.-secs.	2630	2890	3068	3235	3408	3586	3768	3952
Muzzle Energy, total ft.-tons	2388	2566	2723	2850	2961	3061	3158	3252
Perforation through Steel, in ins.	576	665	749	828	907	987	1067	1147
Perforation through Iron, Tresidder's formula	7.13	7.91	8.58	9.12	9.68	10.25	10.82	11.40
Perforation Krupp Steel, 3000 yards	9.9	11.0	11.7	12.4	13.1	13.8	14.5	15.2

COAST GUNS.

Calibre, in centimetres.	7.5	10.5	12	15	21	24	28	30.5
Calibre, in inches.	2.95	4.13	4.72	5.91	8.27	9.45	11.02	12.01
Total Length of Gun, in cal.	40	45	40	45	50	40	45	50
Length of Bore, in inches.	9.84	11.07	12.30	13.78	15.5	17.22	18.77	20.49
Weight of Gun, in lbs.	108.66	123.43	138.19	153.55	174.21	194.89	219.52	244.49
Weight of Gun, in tons.	14.88	17.11	19.36	21.1	24.5	27.9	31.4	35.4
Weight of Steel Projectile, in lbs.	0.83	0.93	1.03	1.13	1.23	1.33	1.43	1.53
Weight of Charge, in lbs.	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
Muzzle Velocity, in ft.-secs.	2876	2999	3123	3247	3371	3495	3619	3743
Muzzle Energy, total ft.-tons.	2664	2775	2885	2995	3105	3215	3325	3435
Perforation through Steel, in ins.	620	703	795	888	981	1074	1167	1260
Perforation through Iron, Tresidder's formula	7.52	8.23	8.98	9.73	10.48	11.23	11.98	12.73
Perforation Krupp Steel, 3000 yards	10.5	11.3	12.0	12.8	13.5	14.3	15.0	15.8

There are other and later types of Krupp guns, of which particulars have not been obtained.

BETHLEHEM STEEL CO.

ORDNANCE.

This Table is supplied by the Manufacturers.

Calibre.	Length of bore in Calibres.	Calibre.	Weight of Gun.	Weight of Projectile.	At Muzzle.		Perforation of Wrought Iron.	At 3000 yards Range.			At 8000 yards Range.			Limiting ranges beyond which capped armour piercing projectiles will not performe Krupp hard-faced armour of 12 inches and 7 inches thickness.			
					Velocity.	Energy.		Dangerous Space for target 25 feet high.	Energy.	Perforation of Krupp hard-faced armour by capped projectiles, with normal impact.	Remaining velocity ft. per sec.	yards.	Remaining velocity ft. per sec.	yards.	Remaining velocity ft. per sec.	yards.	7-in. plate.
1-457	46	3-7	120	1	2300	37	..	..	..	..	..	..	..	..	..	..	..
1-851	46	4-7	550	3	2600	142	..	..	..	..	..	..	..	..	..	..	..
2-244	50	5-7	960	6	2400	240	..	..	..	..	..	..	..	..	..	..	..
3	50	7-62	1900	13	2800	707	..	..	..	..	..	..	..	..	..	..	..
4	40	10-16	1-6	33	2250	1,159	..	..	..	..	..	..	..	..	..	..	..
4	50	10-16	2-6	33	2900	1,924	..	..	..	..	..	..	..	..	..	..	..
4	50	12-0	4-2	45	2500	2,623	12-2	211	..	..	..	..	..	..	..	..	..
5	45	12-7	3-4	60	2500	2,599	15-1	250	..	..	..	..	..	..	..	..	..
5	50	12-7	4-75	60	2900	3,490	16-9	222	..	..	..	..	..	..	..	..	..
5	45	15-24	7-2	105	2600	4,967	19-7	277	..	..	..	..	..	..	..	..	..
6	50	15-24	8-4	105	2900	6,180	23-2	279	..	..	..	..	..	..	..	..	..
6	45	17-78	12-7	165	2800	8,967	24-4	299	..	..	..	..	..	..	..	..	..
7	50	17-78	14-5	165	2900	9,619	28-3	210	..	..	..	..	..	..	..	..	..
8	35	20-32	15-2	316	2250	10,500	28-4	293	..	..	..	..	..	..	..	..	..
8	45	20-32	18-6	250	2800	13,587	38-6	298	..	..	..	..	..	..	..	..	..
10	35	25-4	30-0	604	2250	21,200	39-7	328	..	..	..	..	..	..	..	..	..
10	45	25-4	35-4	504	2800	27,174	50-1	234	..	..	..	..	..	..	..	..	..
12	35	30-48	52-0	1046	2250	36,701	50-9	344	..	..	..	..	..	..	..	..	..
12	45	30-48	53-0	850	2800	46,195	50-4	220	..	..	..	..	..	..	..	..	..
14	35	35-56	57-0	1660	2150	53,190	49-2	207	..	..	..	..	..	..	..	..	..
18	28	45-72	60-0	2075	2150	66,490	49-2	207	..	..	..	..	..	..	..	..	..

* Givré's Formula.

Guns from 3 inches to 6 inches calibre can be fitted either to use loose or fixed ammunition.

TABLE RELATING TO CONVERSION OF MEASURES.

Length.

METRIC TO ENGLISH.

ENGLISH TO METRIC.

L. Mètres.	II. Yards.	III. Feet.	IV. Inches.	V. Yards.	VI. Mètres.	VII. Feet.	VIII. Mètres.	IX. Inches.	X. Centimètres.
1	1·0936	3·2809	39·37	1	0·91438	1	0·30479	1	2·5400
2	2·1873	6·5618	78·74	2	1·82877	2	0·60959	2	5·0799
3	3·2809	9·8427	118·11	3	2·74315	3	0·91438	3	7·6199
4	4·3745	13·1236	157·48	4	3·65753	4	1·21918	4	10·1598
5	5·4682	16·4045	196·85	5	4·57192	5	1·52397	5	12·6998
6	6·5618	19·6854	236·22	6	5·48630	6	1·82877	6	15·2397
7	7·6554	22·9663	275·60	7	6·40068	7	2·13356	7	17·7797
8	8·7491	26·2472	314·97	8	7·31507	8	2·43836	8	20·8196
9	9·8427	29·5281	354·34	9	8·22945	9	2·74315	9	22·8596

EXPLANATION.—To convert any number from one measure to the other, take the values of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus, find the number

of yards in 2354 mètres (see cols. I. & II.). mètres. yards. 2000=2187·3 300=328·09 50=54·68 4=4·37 ∴ 2354=2574·44	of feet in 12·4 mètres (see cols. I. & III.). mètres. feet. 10=32·809 2=6·562 0·4=1·312 ∴ 12·4=40·693	of inches in 30·5 centimètres (see cols. I. & IV.). Note, 1 m.=100 cm. cms. inches. 30·0=11·811 ·5=·197 ∴ 30·5=12·008	of mètres in 1028 yards (see cols. V. & VI.). yards. mètres. 1000=914·38 20=18·29 6=5·49 ∴ 1028=938·16	of mètres in 1742 feet (see cols. VII. & VIII.). feet. mètres. 1000=304·79 700=213·36 40=12·19 2=0·61 ∴ 1742=530·95	of centimètres in 17·72 ins. (see cols. IX. & X.). inches. cms. 10·0=25·400 7·0=17·780 0·7=1·778 ·02=.061 ∴ 17·72=45·009
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NOTE.—A ready way of approximately converting all French measures into English inches is to multiply by 4 and apply the decimal point by common sense—Thus for a 15-cm. gun; $15 \times 4 = 60$. Now this Calibre cannot be 60 inches, nor can it be 0·6 inch; therefore it must be 6 inches. (The exact value is 5·906 in.)

Weight.

METRIC TO ENGLISH.

ENGLISH TO METRIC.

I. Kilo-grammes.	II. Tons.	III. Pounds Avoirdupois.	IV. Grains Troy.	V. Tons.	VI. Milliers.	VII. Pounds Avoirdupois.	VIII. Kilo-grammes.	IX. Grains. Troy.	X. Gramme.
1	·000984	2·2046	15432·8	1	1·016	1	0·4536	1	·0648
2	·001968	4·4092	30864·7	2	2·032	2	0·9072	2	·1296
3	·002953	6·6139	46297·0	3	3·048	3	1·3608	3	·1944
4	·003937	8·8185	61729·4	4	4·064	4	1·8144	4	·2592
5	·004921	11·0231	77161·7	5	5·080	5	2·2680	5	·3240
6	·005905	13·2277	92594·1	6	6·096	6	2·7216	6	·3888
7	·006889	15·4323	108026·4	7	7·112	7	3·1751	7	·4536
8	·007874	17·6370	123458·8	8	8·128	8	3·6287	8	·5184
9	·008858	19·8416	138891·1	9	9·144	9	4·0823	9	·5832

EXPLANATION.—To convert any number from one measure to the other, take the values of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus, find the number

of tons in 35 milliers (see cols. I. & II.). Note, 1000 kg. = 1 millier). milliers. tons. 30 = 29·53 5 = 4·92 ∴ 35 = 34·45	of pounds in 56·3 kilo-grammes. (see cols. I. & III.). kgms. lbs. 50 = 110·231 6 = 13·228 0·3 = ·661 ∴ 56·3 = 124·120	of grains in 120 grammes (see cols. I. & IV.). Note, 1000 grms. = 1 kg.) grammes. grains. 100=1543·23 20=308·65 ∴ 120=1851·88	of milliers in 38 tons (see cols. V. & VI.). tons. milliers. 30 = 30·48 8 = 8·13 ∴ 38 = 38·61	of kilogrammes in 68 pounds (see cols. VII. & VIII.). lbs. kgs. 60 = 27·216 8 = 3·629 ∴ 68 = 30·845	of grammes in 85 grains (see cols. IX. & X.). grains. grammes. 80 = 5·184 5 = 0·324 ∴ 85 = 5·508
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NOTE.—7000 grains troy = 1 pound avoirdupois.

PRESSURE.

METRIC TO ENGLISH.			ENGLISH TO METRIC.			ATMOSPHERIC TO ENGLISH.			ENGLISH TO ATMOSPHERIC.	
I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	XI.
Kilo-grammes per square centimetre.	Pounds per square inch.	Tons per square inch.	Pounds per square inch.	Kilo-grammes per square centimetre.	Tons per square inch.	Kilo-grammes per square centimetre.	Atmospheres.	Tons per square inch.	Tons per square inch.	Atmospheres.
1	14·223	·00635	1	·07031	1	157·49	1	·00656	1	152·38
2	28·446	·01279	2	·14062	2	314·99	2	·01313	2	304·76
3	42·668	·01905	3	·21003	3	472·48	3	·01969	3	457·14
4	56·891	·02540	4	·28124	4	629·97	4	·02625	4	609·52
5	71·114	·03175	5	·35155	5	787·47	5	·03281	5	761·91
6	85·337	·03810	6	·42186	6	944·96	6	·03938	6	914·29
7	99·560	·04445	7	·49217	7	1102·45	7	·04594	7	1066·67
8	113·783	·05080	8	·56248	8	1259·95	8	·05250	8	1219·05
9	128·005	·05715	9	·63279	9	1417·44	9	·05906	9	1371·43

NOTE.—One atmosphere is taken to be 14·7 lbs. per square inch.

EXPLANATION.—To convert any number from one measure to the other, take the value of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus, find the number

of pounds per square inch in 32·1 kilo-grammes per square centimetre (see cols. I. & II.).	of tons per square inch in 3210 kilo-grammes per square centimetre (see cols. I. & III.).	of kilogrammes per square centimetre in 15 lbs. per square inch (see cols. IV. & V.).	of kilogrammes per square centimetre in 18·3 tons per square inch (see cols. VI. & VII.).	of tons per square inch in 3254 atmospheres. (see cols. VIII. & IX.).	of atmosphere in 14·6 tons per square inch. (see cols. X. & XI.).
kg. per sq. cm. = 426·68 2 = 28·45 0·1 = 1·42	lbs. per sq. in. = 3000 = 19·05 200 = 1·27 10 = ·06	lbs. per sq. in. = 10 = ·7031 6 = ·3516	tons per sq. in. = 10 = 1574·9 8 = 1259·95 0·3 = 47·25	atmo- spheres. = 3000 = 19·69 200 = 1·31 50 = ·33 4 = ·03	tons per sq. in. = 10 = 1523·8 4 = 609·5 0·6 = 91·4
∴ 32·1 = 426·68	∴ 3210 = 19·05	∴ 15 = 1·0517	∴ 18·3 = 2882·10	∴ 3254 = 21·36	∴ 14·6 = 2224·7

ENERGY.

METRIC TO ENGLISH.		ENGLISH TO METRIC.	
I.	II.	III.	IV.
Mètre-tons.	Foot-tons.	Foot-tons.	Mètre-tons.
1	3·2291	1	0·3097
2	6·4581	2	0·6194
3	9·6872	3	0·9291
4	12·9162	4	1·2388
5	16·1453	5	1·5484
6	19·3743	6	1·8581
7	22·6034	7	2·1678
8	25·8324	8	2·4775
9	29·0615	9	2·7872

1 mètr. e-ton is termed a "dinamode" in Italy.

EXPLANATION.—To convert any number from one measure to the other, take the values of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus find the number

of foot-tons in 4367 mètr. tons (see cols. I. & II.).	of mètr. tons in 3392 foot-tons (see cols. III. & IV.).
mètre-tons. = 4000 = 12916·2 300 = 868·72 60 = 193·74 7 = 22·60	foot-tons. = 3000 = 929·1 500 = 164·84 90 = 27·87 2 = ·62
∴ 4367 = 14101·26	∴ 3592 = 1112·43

PERFORATION THROUGH IRON AND STEEL WITH THE FACE NOT HARDENED.

To obtain perforation through steel equivalent to a given perforation through iron, and vice versa.

1 inch steel = 1½ inches iron;

that is, 4 inches steel = 5 inches iron.

Thus, given 9·4 inches perforation through iron,

$$9·4 \times \frac{3}{5} = 7·52 \text{ inches steel;}$$

or, given 5·2 inches steel,

$$5·2 \times \frac{5}{4} = 6·5 \text{ inches iron.}$$

PART IV.

STATISTICS, OFFICIAL STATEMENTS AND
PAPERS.

STATEMENT showing the GROSS EXPENDITURE on NAVAL SERVICES for the YEARS 1905-1906 to 1907-1908, together with the
ESTIMATED GROSS EXPENDITURE for 1908-1909 and 1909-1910.

	ACTUAL EXPENDITURE.			ESTIMATED EXPENDITURE.		
	1905-1906.	1906-1907.	1907-1908.	1908-1909.	1909-1910.	
	£	£	£	£	£	
Gross Expenditure (Navy Vote)...	34,861,413	33,262,649	32,866,506	33,942,003	36,782,930	
Abate : Annuity under the Naval Works Acts, } 1895 to 1905	1,015,812	1,094,309	1,214,402	1,264,032	1,330,356	
Expenditure from Loans...	33,845,631	32,168,340	31,652,104	32,677,971	35,452,634	
Value of Stores drawn from stock, without } replacement, in aid of cash expenditure ...	3,313,604	2,431,201	1,083,663	948,262	--	
Expenditure on behalf of Naval Services from } Votes of other Departments	768,850	1,024,200	1,294,802	500,150	156,000	
	372,695	354,084	341,346	332,742	394,565	
TOTAL	88,800,780	85,977,825	84,371,915	84,509,125	86,003,199	

First Lord's Statement explanatory of Navy Estimates, 1909-10.

THE Estimates for 1909-10 amount to £35,142,700, as compared with £32,319,500 for the current year.

The principal increases occur under the heads of Pay of *Personnel* (Vote I.), Victualling (Vote II.), Ordnance (Vote IX.), Works (Vote X.), and the three sections of Shipbuilding (Vote VIII.).

The total number of the *personnel* remains at the same figure as that at which it has stood for the past two years. The increase of £150,000 for pay is partly due to a correction of what has proved to be an underestimate in the past; the last two completed years (1906-7 and 1907-8) have resulted in deficits of £254,000 and £155,000 respectively.

A provision of some £75,000 has also to be made to meet the further development of various schemes approved in previous years, which have carried with them improvements in the pay and allowances of the Fleet.

The rise in the Vote for victualling and clothing is due, in the main, to the fact that, as was explained in last year's Estimates statement, stocks of victualling stores purchased in previous years have been drawn upon without replacement during the last three financial years. The amount by which the Vote was relieved in the current financial year was £100,000. There are no more surplus victualling stores left to draw upon, and £100,000 extra is therefore required to provide the corresponding supplies by cash purchases next year.

The £30,400 balance of the increase is due to a rise in the price of fresh food, principally meat.

In Vote IX. for armaments, *i.e.*, guns, ammunition, etc., again part of the increase is caused by the necessity for cash purchases of stocks of stores, of which for some years there has been a surplus to use up. Last year this Vote was relieved in this respect by the utilisation of certain stocks without replacement to the extent of £200,000. There will be a remaining surplus of stocks to the value of £105,000 next year, so that nearly £100,000 out of the total increase of £332,300 is required under this head. The balance of the increase is due in the main to the enhanced cost of the guns and ammunition for the new ships about to be built.

The heavy charge under Vote X. is due, in the first place, to the beginning of large instalments of the cost of the new lock at Portsmouth Dockyard, and of the Rosyth contract which has just been let. The other big items under this Vote are the completion of the large works at home and abroad which have been constructed under the Naval Works Loan Acts, and the payment for which now falls on the Estimates. £641,700 has to be provided for this purpose, an increase of over £251,000 on last year's figure.

The increases shown under the Annuity Subhead of Vote X., and under Votes XII., XIII., and XIV., are automatic and uncontrollable, the pension Votes and the annuity alone accounting for a rise of over £140,000. The extra charge of £29,600 for Vote XI. is due to a great number of small requirements, none of which in themselves involve a serious expense.

Shipbuilding and Repairs.

New construction for the year will cost £8,885,194, as against £7,545,202 for 1908-09. £6,599,424 will be spent on a continuation of work on ships already under construction, and £2,285,770 for beginning work on ships of the new programme, for which financial provision is made in the Estimates as follows:—

- 4 Battleships (Dreadnought type),
- 6 Protected Cruisers,
- 20 Destroyers,

and a number of Submarine Boats, for which a sum of half a million pounds is allowed.

In addition to the above provision for ship construction, His Majesty's Government may, in the course of the financial year 1909-10, find it necessary to make preparation for the rapid construction of four more large armoured ships, beginning on the 1st April of the following financial year. They therefore ask Parliament to entrust them with powers to do this effectively; such powers would enable them to arrange in the financial year 1909-10 for the ordering, collection, and supply of guns, gun-mountings, armour, machinery, and materials for shipbuilding, thus making possible the laying down on April 1st, 1910, of four more ships, to be completed by March, 1912.

The estimated time for the completion of a battleship is now taken as two years; but this period does not cover the whole time during which work is being done in obtaining necessary materials and in the manufacture of certain parts of the ship's equipment, such

as gun-mountings. Three months' notice in advance ought to be given to contractors to ensure completion within two years from the date of the order of the hull, and if an exceptionally heavy demand were to be made on the contractors, much longer notice would be required. The actual date of "laying down" can indeed be postponed for some time without delaying the final completion of the ship, provided that work is proceeding in the manufacture of guns, gun-mountings, machinery and armour, and that the materials for the hull are all collected at the yard ready for immediate building. It is on an estimate of time in which allowance is made for these facts, that the period of construction of a battleship is reckoned at two years.

For some years past it has been the practice for ships of the new programme to be laid down very late in the financial year. An obvious effect of this system is to postpone for some two years a large part of the financial burdens of the programme to which the ships belong. In the programme of the new financial year, two battleships are to be laid down in July, which is the earliest date on which we can lay them down, having regard to the necessary notices to contractors for the supply of certain parts of the ship. Two more battleships are to be laid down in November, and in respect of these four ships a sum of £1,531,600 is taken in the Estimates.

There will thus be heavy payments required for four new battleships during the first financial year of their construction, the excess on this item over the corresponding charge of last year being £1,274,215.

£150,000 of the increase under section II. of Vote VIII. is caused (as in Votes II. and IX.) by the necessity for cash provision of stores, which have in previous years been taken out of stocks without replacement.

The great fall in the price of coal, and the state of the shipbuilding trade, has enabled the Admiralty to place orders for the annual requirements of coal for the Fleet and for the new ships of the current year's programme on most advantageous terms.

Between April 1st, 1908, and March 31st, 1909, the following ships will have been completed and become available for service:—

- 3 Battleships (Lord Nelson (delayed from previous year), Agamemnon, and Bellerophon).
- 4 Armoured Cruisers (Indomitable, Inflexible, Invincible, and Defence).
- 5 Destroyers—Tribal Class (three delayed from last year).
- 17 First Class Torpedo Boats (Coastal Destroyer type).
- 7 Submarines.

On April 1st, 1909, there will be under construction :—

- 6 Battleships.
- 1 Armoured Cruiser (Invincible type).
- 2 Unarmoured Cruisers.
- 5 Second Class Protected Cruisers.
- 25 Torpedo Boat Destroyers.
- 6 First Class Torpedo Boats (Coastal Destroyer type).
- 19 Submarines.

I am glad to be able to say that cooling machinery for the cordite magazines on board H.M. ships has now been provided for all completed battleships and cruisers which are likely to be retained on the active list, and for all ships under construction except destroyers and smaller craft.

The long continuance of the labour disputes in the private ship-building yards has seriously delayed the progress of most of the ships that were under construction during the year.

The Board are giving careful attention to the possibility of constructing floating docks for the repair of men-of-war of various sizes. The idea, of course, is no new one, but the serious want of dock accommodation for our biggest ships on the east coast, and the long time that the construction of permanent works on shore is bound to take, justify an exhaustive investigation of the question, whether the provision of floating docks at certain of our ports would not be an advisable step. Floating docks possess the great advantage of mobility, and for torpedo craft they could probably be used with safety at several ports where they are much needed. There are, however, unquestionably great difficulties in the use of floating docks for the repair of big ships. On the English coasts the large rise and fall of tide makes the safe mooring of floating docks in close proximity to the dockyard or a shipbuilding centre a very serious problem, and the depth of water needed is so great that a considerable amount of dredging would be necessary in many localities.

The question of the use of dirigible airships for naval purposes has been under consideration, and it has been decided to carry out experiments and construct an aerial vessel.

Administration.

During the past year the Admiralty have taken over from the War Office the supply of all ordnance and ordnance stores for the Navy and, in addition, have become responsible for all inspection of such stores outside Woolwich Arsenal. The system has so far

worked with success, and is one well adapted for expansion under the stress of war conditions.

The recruiting of the Naval Medical Service has for some time been a matter of anxiety to successive Boards of Admiralty. I have now appointed a Committee to inquire into the Naval Medical Service, composed as follows :—

Admiral Sir John Durnford, K.C.B., D.S.O. (*Chairman*).

Inspector-General James Porter, C.B., M.D., M.A. (Medical Director General).

Surgeon-General Sir Alfred Keogh, K.C.B., M.D.

Mr. J. H. Brooks, Principal Clerk.

Sir William W. Cheyne, Bart., C.B.

Deputy-Inspector-General William H. Norman, R.N.

Mr. G. L. Cheatle, C.B., F.R.C.S.

Mr. J. S. Barnes, Admiralty, *Secretary*.

We hope, with the able assistance of these gentlemen, that we shall devise some means of putting the Naval Medical Service upon a more satisfactory footing.

The system of discipline and routine at the naval prisons has remained unaltered for a great many years, and having in view the change of public opinion with regard to the treatment of prisoners in civil gaols, the Board are taking steps to consider how far any change in the direction of bringing the naval practice into closer conformity with that of the general prison system of this country is desirable; and with this object in view, I have appointed a committee under the presidency of Rear-Admiral F. S. Brock to inquire into the subject.

An installation of wireless telegraphy has been put up at the Admiralty Office in Whitehall, and, in conjunction with the system of wireless stations under Admiralty control, enables communication to be maintained with H.M. ships at sea. This means of direct and immediate communication has already proved of value in the administration of the Naval service.

The arrangements for the transfer of the torpedo factory from Woolwich to Greenock, and the torpedo range from Weymouth to Loch Long, are being worked out. I hope that a large proportion of the workpeople will consent to remain in the Admiralty service when the transfer is made.

The staff of draughtsmen in the Hydrographic Department has been reorganised and considerably strengthened. It is anticipated that the changes introduced will enable the large increase of the work in connection with charts to be dealt with thoroughly and promptly.

A reorganisation of the staff of the Contract Department has been carried out. In future, the whole of the directing staff of this Department will be recruited from the same examination as is prescribed for the Supply Departments of the Admiralty, instead of from the Higher Division examination.

I have continued the practice adopted by my predecessor of personally visiting the naval ports for the purpose of hearing on the spot the petitions of the employés at the royal dockyards.

My colleagues and I are very glad to have this opportunity of coming into personal contact with the workmen, and hearing from their own lips of any grievance which they desire to have adjusted.

Personnel.

A full report has recently been presented to the Admiralty from the Flag Officers who have been in charge of the vessels manned by nucleus crews on the system, which has now been at work for some four years. The reports received are of a most favourable character, and all the Flag Officers concerned agree that the nucleus crew system ensures a readiness for war and a general efficiency which has never before been obtained—at least since the introduction of steam machinery into the Navy. It must be remembered that before the introduction of the nucleus crew system such ships as were not fully manned were entirely without officers or crew, and left laid up in the dockyards, which they never left until their turn came for full commission. Now, on the other hand, the ships are taken to sea for cruising and gunnery practice, and are thus kept in a state of working efficiency that could not otherwise be contemplated. The chief advantage, however, obtained under the system of nucleus crews is the greatly increased proficiency in gunnery due to the more permanent association of the principal officers and men with the ship and her armament. The recent battle practice returns are a most satisfactory evidence of this.

While practically all ranks and ratings in the Fleet have received increases of pay from time to time during recent years, officers of the rank of Commander have been still paid the same rate as they were in 1864. It has accordingly been decided to increase the full pay of Commanders from 20s. to 22s. a day. It has afforded the Board of Admiralty very great satisfaction to have been able thus to show their appreciation of the value of a class of officers on whose loyal and praiseworthy exertions so much of the efficiency of the Fleet depends.

During the past year it was decided to introduce, experimentally in the General Depots at the Home Ports, a system of payment in

advance to men going on long leave of a proportion of the pay which would become due to them while absent, as had previously been done in the case of Marines serving at headquarters. The experiment has proved thoroughly successful, the concession being very satisfactory to the men without involving expense to the Crown, and it is now proposed to extend it to all ships and establishments at home.

Until lately it was the practice to withhold a portion of the wages of the men who made allotments from their pay to relations at home, in order to safeguard the Crown against loss in case of desertion. Last year it was decided to abolish this allotment reserve, and the result has evidently been much appreciated by the men, as the number of allotments made during the past year has increased by upwards of 5000, and there has been a material reduction in the number of applications made to the Admiralty for support by relatives of men in the Naval service.

Works.

The contract for the graving dock, closed basin, and entrance lock, to be constructed at the new naval base at Rosyth, has recently been placed with an eminent firm of engineers, who are required to complete the work in seven years, and will be given a substantial bonus for each week that they can save on this time. The same inducement for early completion has been offered to the contractors for the new lock at Portsmouth, which was ordered last August and is a matter of pressing necessity owing to the increased size of modern armoured ships.

A large increase of magazine accommodation has for some time been urgently required, and after careful examination of various sites in the United Kingdom for the establishment of a magazine depot, some property has been secured a few miles above Rosyth on the north shore of the Firth of Forth, and plans for its erection are being designed.

Coast-guard.

The report of the Inter-Departmental Conference on the Coast-guard was presented to Parliament last year, but, as indicated in the various statements made on the subject in both Houses of Parliament, no final decision has been arrived at as to the carrying out of the changes involved.

Colonial Naval Affairs.

Owing to the change of Ministry in the Parliament of the Australian Commonwealth, and pending a communication from the

new Government, no further action has been taken to give effect to the scheme for the establishment in Australian waters of a local defence flotilla of destroyers and submarines, particulars of which were published in the Parliamentary paper issued last session. The New Zealand Dominion Parliament has passed an Act, increasing the Colonial contribution to the Navy from £40,000 to £100,000 a year, unaccompanied by conditions. This is a gratifying instance of the readiness of the Dominion to assist the Mother Country in the heavy charges for the maintenance of the Fleet. Both the Cape and the Natal legislatures have passed Acts for the purpose of establishing branches of the Royal Naval Volunteer Reserve in those colonies, and a Bill will be introduced in this session to give the necessary sanction of the Imperial Parliament. A Bill will also be introduced to sanction the arrangement by which the Canadian Government have undertaken to maintain for the Imperial Navy the naval establishments at Halifax and Esquimalt.

Maritime Conference.

A conference, representative of the principal Naval Powers, was assembled in London at the beginning of December in order to establish, if possible, a general agreement as to certain doubtful points of international law, which it was important to decide before effect could be given to the convention for the establishment of an international court of appeal in prize cases.

The conference completed its labours at the beginning of this month, and a declaration has been signed dealing with some of the most important questions which arise in connection with the laws of naval warfare.

Distribution of the Fleet.

The new financial year will be marked by a further development of the Home Fleet. The Channel Fleet will be absorbed into it, and there will be a rearrangement of the cruiser squadrons and torpedo flotillas. The distribution will be as follows:—

There will be sixteen fully-manned battleships in the Home Fleet, formed in two divisions, and associated with them will be six battleships of the Atlantic Fleet (which will in future use Dover as a base as well as Berehaven), making a total of twenty-two fully-manned battleships in Home waters.

Ten fully-manned armoured cruisers, formed in two squadrons, will be attached to the Home Fleet, and associated with them will be the squadron of four armoured cruisers attached to the Atlantic Fleet, making a total of fourteen fully-manned armoured cruisers

in Home waters, exclusive of five armoured cruisers employed at sea on training service.

There will also be in the fully-manned divisions of the Home Fleet ten attached cruisers and scouts, forty-eight destroyers and various auxiliary vessels.

The nucleus crew vessels (including the remainder of the destroyers) and the submarines, and the special service vessels with reduced nucleus crews, will be organised as two additional divisions of the Home Fleet, the third and fourth, under a Vice-Admiral.

The opportunity will be taken of renumbering the cruiser squadrons in accordance with the new organisation.

The First and Second Cruiser Squadrons will form part of the first and second divisions of the Home Fleet. The name "Third Cruiser Squadron" is reserved for the armoured cruisers of the third division of the Home Fleet when combined. The fourth Cruiser Squadron will be the training squadron as at present. The Cruiser Squadrons attached to the Atlantic and Mediterranean Fleets will be the fifth and sixth respectively.

It was the intention of the Admiralty when the outlying colonial and foreign squadrons were withdrawn or reduced, to send powerful cruiser squadrons from time to time on visits to the stations so dealt with. An opportunity arose this autumn for such a cruise, through the request of the High Commissioner for South Africa that a squadron might be present at Durban on the occasion of the opening of the South African Convention. The Second Cruiser Squadron was despatched to the Cape in September, and received a cordial welcome at the ports of Cape Colony and Natal. A number of the officers and men were also warmly received at the South African capitals, and at Johannesburg. At the close of its stay in South Africa the squadron proceeded to South America, where complimentary visits have been paid at Rio de Janeiro, Montevideo and Buenos Aires.

The exercises and cruises of the sea-going fleets have been satisfactorily carried out. The Channel Fleet is proceeding for a cruise to Lough Swilly for about ten days. The Atlantic Fleet, having returned from Gibraltar, is now at Dover, as that harbour has become available for the use of a fleet. The Home Fleet, consisting of fifty-seven vessels (of which forty-three carry their full complement of officers and men), is now engaged in exercises in the North Sea.

I append the usual record of work done by the Department during the past year.

REGINALD MCKENNA.

March 10th, 1909.

STATEMENT OF WORK, &c., 1908-9.

CHANGES IN THE COMPOSITION OF THE FLEETS.

Mediterranean.

In the Battleship Squadron the Exmouth and Duncan replaced the Queen and Prince of Wales as flagships; the remaining four battleships are at the present time: Ocean, Canopus, Glory, and Goliath.

No change has been made during the year in the cruisers attached to the Battle Squadron or in the composition of the Third Cruiser Squadron.

Fourth Cruiser Squadron.

The first-class cruiser Hogue was temporarily replaced by the Sutlej, until the latter turned over to the Donegal. The Berwick will shortly replace the Cressy.

The Indefatigable and Scylla have been engaged on duties in the West Indies; events in the Island of Haiti have necessitated the frequent presence of these ships at Port au Prince throughout the year.

The cruiser Brilliant was employed in Newfoundland waters during the fishery season, and subsequently proceeded south for a cruise in the West Indies.

China and Australia.

The composition of these squadrons has remained unaltered.

East Indies and Cape of Good Hope.

The second-class cruiser Highflyer has been replaced on the East Indies Station by the Fox.

On the Cape Station the Pandora has relieved the Pelorus.

West Coast of America.

The Shearwater has carried out cruises to various ports in North and South America.

H.M.S. Algerine was commissioned in March last for service on this coast, and undertook the Behring Sea patrol during 1908.

Atlantic Fleet, including Second Cruiser Squadron.

H.M. Ships Prince of Wales and Queen having been transferred to the Atlantic Fleet from the Mediterranean, the composition of the Battle Squadron became as follows:—Prince of Wales, Albemarle, Albion, Cornwallis, Queen, and Russell.

The Good Hope replaced the Drake as flagship of the Second Cruiser Squadron, the Drake being transferred to the First Cruiser Squadron.

The Dwarf, which is affiliated to the Atlantic Fleet, has been employed as in previous years mainly on the West Coast of Africa, but has also paid a visit to South American waters. The cruiser Amethyst has also been recently affiliated to the Atlantic Fleet for duty in South Atlantic waters.

Channel Fleet, including First Cruiser Squadron.

The Battle Squadron of the Channel Fleet was strengthened by the substitution for the Illustrious, Vengeance, and Ocean, of the London, Irresistible, and Bulwark. The Implacable, after a thorough refit, took the place of the Venerable.

With the exception of the replacement of the Drake by the Good Hope, already referred to, the composition of the cruiser and destroyer flotillas attached to the Channel Fleet has remained unaltered.

Home Fleet.

The strength of the Home Fleet has steadily developed throughout the year, though owing to the shipbuilding strike the arrival of new ships has not proceeded so fast as was anticipated.

The Bellerophon, Lord Nelson, Agamemnon, Indomitable, Inflexible, Minotaur, Shannon, and Defence have, however, joined this Fleet during the past twelve months. The Invincible will be commissioned this month.

H.M.S. Vulcan has recently been commissioned as an additional seagoing dépôt ship for submarines, in view of the steady delivery of submarines throughout the year.

Cadets' Training Ships.

The Cumberland and Cornwall have been employed, as in 1907, as training cruisers for the Cadets entered under the new scheme of education, and have proceeded on cruises to the Mediterranean, North American and other waters.

Coast-guard and Fishery Service Vessels.

The ships now in commission under the orders of the Admiral Commanding Reserves are the same as last year, with the addition of H.M.S. Spanker (for service in the North Sea).

The following sea-going vessels are employed in Sea Fishery protection and protection of revenue afloat :—

North Sea and Dover to Brighton Fisheries :—Halcyon, Leda Skipjack, Spanker, Squirrel.

Devon and Cornwall Fisheries :—Argus, Fanny, Julia.

Irish Fisheries :—Colleen, Thrush.

Scottish Fisheries :—Daisy, Ringdove.

The Skipjack has been transferred from the Irish Fisheries to the North Sea, and her place on the Irish Fisheries has been taken by the Thrush, which was previously employed on the North Sea Fisheries.

Special Visits.

On the occasion of His Majesty's visit in June to the Baltic, H.M. Yacht was accompanied to Revel by His Majesty's ships Minotaur and Achilles and four destroyers.

The Commander-in-Chief of the Atlantic Fleet proceeded with His Majesty's ships Exmouth and Arrogant to Lisbon in February, after the news of the sad death of the late King of Portugal, and represented the Navy at the funeral.

H.M.S. Pelorus proceeded from the Cape of Good Hope to South America and visited Pernambuco and Para, and thence steamed up the Amazon River to Iquitos.

The Channel Fleet in June and July visited ports in Denmark, Norway, and Sweden, and shortly after the Fourth Cruiser Squadron visited Norway. The Sapphire visited Oporto, and was present at the birthday celebrations of the King of Portugal.

In July last, Admiral His Royal Highness the Prince of Wales visited Canada in order to be present at the Quebec tercentenary celebrations.

His Royal Highness made the journey across the Atlantic and back in the Indomitable (the first of the new Invincible type of armoured cruisers to be commissioned), on her maiden voyage. Admiral Sir Assheton Curzon-Howe, Commander-in-Chief of the Atlantic Fleet, had preceded the Prince of Wales to Quebec with the Atlantic Fleet.

The Commander-in-Chief, China, with his squadron, again visited Yokohama this year and paid other visits to Japanese ports.

Manœuvres.

Throughout the year the Commanders-in-Chief have carried out tactical and other exercises with the vessels under their orders.

The Annual Manœuvres were carried out in July ; the strategical exercise, in which 268 vessels were engaged, commenced on July 16th and finished on July 21st. During the period of the Manœuvres H.M.S. *Æolus*, with a flotilla of thirty-six torpedo boats and eight submarines, were exercised on the south and east coasts of England between Torbay and Harwich.

*PERSONNEL.**Officers.*

Authority has been obtained to increase the amount of full pay sick leave to junior officers, and in certain other cases from ninety-one days to twelve months, when recommended by the Medical Director General, provided that it is due to causes beyond the Officer's own control, and that there is a reasonable probability of ultimate return to duty.

Additional leave is occasionally given to a ship's crew on paying off after foreign service, when the service performed during the commission has been specially arduous or noteworthy. No corresponding extension of leave, however, could be given to the officers, but this has now been rectified and authority obtained to grant additional full pay leave not exceeding fourteen days to the officers in such cases.

It has been decided that no officer who may be promoted to the rank of Captain or Commander on the active list after March 19th, 1908, shall be granted a step in rank on or after retirement unless he has qualified for promotion prior to retirement, and that no more than one step in rank shall be accorded, except as provided by Order in Council of April 24th, 1902, in the case of officers on the retired list who, when voluntarily re-employed, render service which may merit special recognition.

The following regulations came into force as regards officers promoted to the rank of Captain or Commander after March 19th, 1908, viz. :—

Rear-Admirals retired from that rank to be entitled to rise by seniority to the rank of retired Vice-Admiral.

Captains retired from that rank to be entitled to rise by seniority to the rank of Rear-Admiral, if before retirement they have served the time to qualify them for promotion.

Commanders retired from that rank to be granted, at Admiralty discretion, the rank of retired Captain, provided they have served the time to qualify them for promotion, but such step not to be given before they attain the age of 45 years.

Arrangements have been made to test the knowledge of officers in Navigation, Pilotage, Torpedo, and Gunnery before selections are made for the command of torpedo craft by requiring them to pass a practical examination in these subjects. Any officer who fails to pass is ineligible to receive such an appointment.

Considerable improvements have been made in the pay, pension, and conditions of retirement for Engineer officers. Two good service pensions have been established for Engineer Vice-Admirals and Engineer Rear-Admirals and two for Engineer Captains; the scale and conditions of award of widows' pensions and compassionate allowances to children of Engineer Vice-Admirals, Engineer Rear-Admirals, and Engineer Captains have been assimilated to those in force for corresponding ranks in the executive branch; the rate of increment for Engineer Captains has been raised, and an improved scale of retired pay and revised retirement regulations on similar lines to those of the executive branch have been laid down.

The education of the Naval Cadets at Osborne and Dartmouth is being carried out satisfactorily in accordance with the original scheme, slight modifications being introduced where desirable. It has been decided that an equal number of cadets shall take up the study of French and German respectively so that a larger number of officers will be grounded in the latter tongue, and it is hoped that the supply of Interpreters in German will thereby be increased.

A Circular Letter has been issued to the Fleet defining clearly the principles governing the training and instruction of the New Scheme midshipmen and laying down detailed instructions for the carrying out of that training during the three years they will serve as midshipmen. The plan of the examination for Lieutenant is also made known and the procedure is laid down with an outline of the examination on the various subjects. One of the special features described is that these young officers will serve continuously at sea for at least five years as midshipmen and sub-lieutenants without any break for shore courses, which will be abolished for sub-lieutenants.

The regulations governing the service and advancement of Accountant Officers have been under review, and it has been decided to introduce certain changes in their training and qualifications, to take effect with the entries of 1909. The age qualification for advancement to Assistant Paymaster has been abolished, the system of accelerated promotion in force in the case of junior officers of

other branches has been extended to Clerks, and those who pass the examination for Assistant Paymaster with credit will have their advancement to that rank antedated. The examination for Clerk has been abolished, the examination for Assistant Paymaster has been revised, and an examination has been introduced for the rank of Paymaster.

Men.

The growth of Wireless Telegraphy requirements has been rapid, and it has been found necessary to increase the present numbers of operators more quickly than was anticipated, by the transfer of further volunteers from other ratings in the Service.

In view of the extension of wireless telegraph stations on shore, and the consequent increase in the need for Coast-guard wireless operators and of the responsibility attaching to their work, the scale of allowances to Coast-guard men for this duty has been raised so as to place them so far as possible on an equality with telegraphist ratings in the Fleet who perform similar duties.

Steps are also being taken to provide for the creation of a reserve of wireless telegraphy operators by the admission of telegraphist ratings in the Royal Fleet Reserve under certain conditions. In order to improve the chances of these ratings obtaining employment when they leave the Navy, arrangements have been made with the General Post Office for them to be examined, before taking their discharge, for a certificate of proficiency in mercantile wireless telegraphy.

Following on the recommendations of the Diving Committee, steps have been taken to improve the efficiency of Divers in the Royal Navy. The qualifying course for Artificer Diver has been extended so as to include instruction in repair work under water. Diver ratings have been thrown open to the Armourer and Blacksmith classes. Stress has been laid on the importance of frequent practice, and the arrangements for practical training and exercise have been systematised. The scale of diving pay has been raised to provide adequate remuneration for those who undertake diving operations at depths in excess of 25 fathoms. With a view to the prevention of "caisson" disease, to which men working under great air pressure are liable, directions have been issued for guidance as to the physical conditions to be required of candidates for this rating.

The arrangements for the training of Boy Artificers and Mechanicians are being carried out with good results, and satisfactory reports continue to be received of both classes since they have been drafted to sea.

It is interesting to note that at the recent passing-out examination of Boy Artificers one of the boys did the best piece of work in the workmanship test that has been known to have been carried out by either a candidate from outside sources or by a boy trained in the establishment.

The rating of Acting Leading Stoker has been introduced from April 1st, 1908; detailed arrangements have been made for regulating the method of advancement and the numbers required of this rating, and the complements of ships have been adjusted accordingly.

The substitution of Able Seamen for Warrant Officers' Stewards and Cooks, third-class, has now been applied generally—the trial which was made last year in certain fleets having proved successful.

An allowance of 3*d.* a day has been instituted for Seamen Gunners detailed to assist Gunnery Lieutenants in clerical work on board ships fitted with hydraulic and electric gun mountings.

During the financial year 1907–8, 9578 ratings were entered from the shore by the various recruiting agencies. The requirements for the current year were met early in the year, and with an unusually large number of candidates presenting themselves for entry, it became necessary to suspend recruiting temporarily for certain ratings, including Boys, Seamen, and Stokers, in order to keep the total numbers borne within the authorised limits. Recruiting has now been resumed.

Royal Marines.

The numbers borne on March 31st, 1909, will be about 16,900.

There will be about 1200 Royal Marines for Naval Bands. The number of bands embarked under the new scheme is 44, and it is anticipated that this number will be increased by five by the end of the month.

Royal Marine Captains of eight years' seniority receive pay at the rate of 14*s.* 7*d.* per day in the R.M.A., and 14*s.* 1*d.* in the R.M.L.I., and no provision is made for any further increase until they are promoted to the rank of Major, when they receive 16*s.* 1*d.* and 15*s.* 7*d.* respectively.

In view of the length of time that some of the officers are likely to remain on the list before promotion, in some cases amounting to 17 years, the following intermediate rates have been approved, viz. :—

	R.M.A.	R.M.L.I.
After 11 years	15 <i>s.</i> 1 <i>d.</i>	14 <i>s.</i> 7 <i>d.</i>
After 14 years	15 <i>s.</i> 7 <i>d.</i>	15 <i>s.</i> 1 <i>d.</i>

The existing rates of pay of non-commissioned officers and men of the Royal Marine Light Infantry have been modified, and the

conditions and provisions for grant of pay and allowances to non-commissioned officers and men of both Royal Marine Light Infantry and Royal Marine Artillery have been revised, with the object of bringing the Royal Marines into line, so far as circumstances admit, with the new regulations for the pay of Naval ratings.

In pursuance of the Admiralty policy in regard to physical training, the Naval system has been applied to the Marines on shore, the staff of the Marine Establishments has been readjusted, and the allowances of Marine Physical Training Instructors is now assimilated to the scale for Naval Physical Training Instructors.

An increased number of Royal Marine officers have been employed afloat for special duties connected with wireless telegraphy, naval intelligence and physical training; further additions are under consideration.

Further opportunity is afforded non-commissioned officers and men to qualify in Army signalling, in order that a proportion may be available for this work whenever their services are likely to be required.

An improved pattern woven web equipment recently introduced into the Army has been adopted for use by Royal Marines, and supplies are being obtained as funds permit. This equipment will supersede both the buff leather and brown leather (1888 and 1903 patterns respectively), to both of which it is considered superior for all purposes for which intended.

Increased rifle range accommodation for R.M. Artillery has been provided at Eastney by the completion of an additional 4-target range up to 500 yards. This was very necessary owing to the numbers of men (trained soldiers and recruits, Royal Fleet Reserve, &c.) requiring to be exercised annually, and will enable the musketry instruction of the division to be carried out much more expeditiously than formerly and with better results.

Royal Fleet Reserve.

The numbers of the Royal Fleet Reserve have increased from a total of 17,964 to 19,613 during the year, the total strength on January 31st being:—

	Class A.	Class B.	Total.
Seamen, &c.	3,382	7,070	10,452
Stokers	1,312	2,718	4,030
Marines	1,846	3,285	5,131
	6,540	13,073	19,613

With the object of materially increasing the efficiency of this reserve, the conditions of enrolment and retention have been made much stricter, both as regards physical requirements and standard of character and capability.

Coast-guard.

Certain Coast-guard stations and detachments, at which neither life-saving apparatus was supplied nor life-boats stationed, have been and are being closed.

The numbers closed are as follows:—

Stations.	Detachments.	Total Complement.
27	22	254

and it is anticipated that 25 stations and 10 detachments with a total complement of 198 will be closed by the end of March.

No men (except four torpedo instructors required specially for wireless telegraph stations) have been entered into the Coast-guard during 1908-9.

The total strength of Coast-guard on April 1st,
1908, was 3,680
and the number estimated to be borne on
March 31st, 1909, is 3,434

The reduction of numbers has been restricted to the non-signal section of the Coast-guard. The signal section (which includes men employed at wireless telegraph stations) has been maintained at full strength by the transfer of the requisite number of men from the non-signal section.

The efficiency of the signal section (including both wireless telegraphy and visual signalling) continues to improve.

A new signal station has been established on Dover Pier, at which commercial maritime signalling is being carried out by the Coast-guard on behalf of Lloyd's. A new signal station, subsidiary to Culver Cliff, has been established at Sandown.

The signal station at Butt of Lewis has been permanently manned from January 1st, 1909, on which date the Coast-guard took over maritime commercial signalling for Lloyd's.

Royal Naval Reserve.

7725 executive officers, seaman and stoker ratings have been transferred to the new system of training during the last twelve months (December 1st, 1907, to November 30th, 1908).

The strength of the Royal Naval Reserve (Home) on December 1st, 1908, was :—

Executive Officers	1,435
Commissioned Engineer Officers	261
Warrant Engineers	90
Engine Room Artificers	616
Seaman Ratings	15,028
Stoker Ratings	5,961

501 of the above executive officers have undergone twelve months' training in the Fleet and are in receipt of training fees. In addition to these 45 are now undergoing this training.

The following numbers have performed drill and training during the twelve months ended November 30th, 1908 :—

	New System.		Old System.
	Three Months' Training afloat.	Annual or Biennial Training.	Drill.
Executive Officers	—	165	583
Seamen ratings	649	1,426	12,951
Stoker ratings	724	894	3,284

The training under the new system continues to be carried out on board ships of the Home Fleet, and the reports on the Royal Naval Reserve men under training made by the commanding officers of these ships are generally satisfactory.

Arrangements have been made to admit of Royal Naval Reserve men from Scotland embarking or disembarking at Scottish ports when ships of the Home Fleet are at such ports.

Royal Naval Volunteer Reserve.

The strength of the Force in six Divisions, comprising forty-two companies, is as follows :—

Royal Naval Volunteers.	Establishment.	Strength, Nov. 30th, 1908.
Officers	186	144
Honorary officers	—	17
Petty officers and men	4,122	3,492
<i>Permanent Staff—</i>		
Officers	7	7
Petty officers and men	64	64

An additional company was established in the Tyneside Division on January 1st, 1909, to replace the company at Weston-super-Mare (Bristol Division) which has been disbanded.

The company at Carnarvon (Mersey Division), which has for some time been much below strength, has been replaced by an additional company at Birkenhead (Mersey Division).

During the current financial year the following numbers have embarked for training afloat for fourteen or twenty-eight days in ships of the Channel and Home (fully manned) Fleets, and also for the cruise to Canada in ships of the Atlantic Fleet (thirty-five to forty days):—

Officers	.	.	.	.	.	89
Petty officers and men	.	.	.	.	.	911

The embarkation in the Atlantic Fleet took place on the occasion of H.R.H. the Prince of Wales going to Canada. His Royal Highness was pleased to express his appreciation of the Naval Volunteers embarked for this cruise when he reviewed them at Quebec. The Commander-in-Chief of the Atlantic Fleet also reported most favourably on the Volunteers embarked.

These embarkations continue to prove most popular and to have excellent results upon the Naval Volunteers, developing resourcefulness on their part, and more firmly establishing the Royal Naval Volunteer Reserve as a real adjunct to the Navy, which would be of much value in an emergency.

The reports on officers and men embarked or under instruction in the schools have been most satisfactory.

Great attention has been, and continues to be, paid to instruction in signalling; there are now over 150 qualified signalmen in the Royal Naval Volunteer Reserve, and it is hoped that this number will be largely increased in the future, as these men would be most useful in time of emergency.

The annual inspection of all the divisions has been completed, and shows a continued improvement in the efficiency, smartness, and general appearance of the Royal Naval Volunteer Reserve.

In order to enable Royal Naval Volunteer divisions to borrow money from the Public Works Loan Board for erection of buildings, &c., and to transact other business in connection with property, an Act has been obtained to extend such provisions of the Military Lands Acts as are applicable to Naval Volunteers.

The changes in the designations and grades of Naval ratings introduced last year have been applied to the Royal Naval Volunteer Reserve; and as the services of volunteer signalmen will be required in war, and a good number of the men have taken up signalling, a

signal branch of the Royal Naval Volunteer Reserve has been established, with ratings similar to those of the signal branch of the Royal Navy.

GREENWICH HOSPITAL.

Northern Estates.

All the farms are let, and it is anticipated that the revenues from both surface and mineral rents will be fully maintained.

Greenwich Estate.

In consequence of the failure of the lessees of the "Ship" Hotel it became necessary to take possession of the premises. A portion of the building has since been re-let as licensed premises for a term of twenty-one years. The remainder of the premises has been demolished and new dwellings, suitable for the district, are now being erected on the site.

The ground leases of certain premises in Lower Park Street and Old Woolwich Road having been surrendered by the lessees, the premises, which were beyond repair, have been demolished and new cottages erected on the site. These are now all occupied.

Royal Hospital School.

The standard of efficiency has been maintained, and the highest possible educational grant again earned.

Painted Hall.

The work of strengthening the roof over the Hall is being proceeded with, but the discovery during the progress of the work of further serious defects in the main timbers will necessitate repairs of a more extensive character than was originally anticipated.

ORDNANCE.

Guns.

The new 12-in. B.L. gun has satisfactorily carried out range and accuracy trials, with improved ballistics over former designs.

An improved 4-in. B.L. high velocity gun has also been introduced, and has proved very satisfactory.

Improved types of breech mechanism have at the same time been adopted.

Small Arms.

The conversion of the long rifle to the new pattern short rifle has been begun. The converted rifles will be issued to the Royal Marines during 1909-10.

Ammunition.

Improved types of heavy and medium projectiles, giving greater ranging and increased penetration, have been adopted, and a satisfactory type of heavy high explosive shell has been evolved.

Cordite.

The arrangements for artificially cooling the magazines of ships are progressing satisfactorily. Great attention has been paid to the safe storage of this propellant, and to the elimination of any lots the stability of which may have deteriorated under storage.

Improvements in the methods of manufacturing the ingredients employed in making cordite, which experience has dictated, have been adopted by all cordite-making firms, and it is confidently anticipated that these improvements will tend to secure greater stability and better keeping qualities in the finished product.

Gun Machinery.

The older types of 12-in. mountings are being brought up to date, and the ships which carry them are gradually being fitted with modern sights and elevating and training control gear. These alterations will enable further improvements in accuracy of fire with these guns to be obtained.

The gunnery trials of the *Invincible* have taken place this year, and are interesting from the fact that this is the only ship in the Service having the 12-in. guns worked by electric power. Several of the 6-in. twin mountings, and one or two of the older type of 9·2-in. mountings, have had some of the operations carried out by electric power, but in this case the whole of the operations connected with loading, training, and elevating the 12-in. guns is performed by this power.

Fire Control.

Further experiments have been carried out for improving existing methods of directing gunfire, both by day and by night.

The supply of range-finders of the most modern type to the ships of the Fleet has been proceeded with, and every effort is being made to improve the accuracy of these instruments.

Gunnery Training and Practices.

The gunnery practices have generally shown an improvement over those of previous years.

The annual tests of gunlayers were carried out under the same conditions in 1908 as the previous year, and the results again show an improvement.

The conditions for the battle practice of torpedo-boat destroyers were similar to those of the previous year. The results show a very marked advance over any obtained heretofore.

The regulations for the battle practice of the Fleet during 1908 were revised so as to assimilate the exercise still more to the conditions which would obtain in warfare. The results have proved satisfactory notwithstanding the increased difficulties of the scheme.

The practices during the coming year will be on the same general lines.

Torpedoes, &c.

Considerable progress has been made in further developing the torpedo. Very satisfactory results have been obtained both in increasing the range and speed.

Mining.

The mining service has been exercised during the last manœuvres and gave much satisfaction. It will be further strengthened and developed by the addition of more ships.

Wireless Telegraphy.

The provision for all ships of wireless telegraphy instruments of improved design and power has made good progress and satisfactory results have been obtained.

Inspection and Proof.

The Admiralty has now assumed the complete control of, and responsibility for, all designs of naval ordnance and ordnance *matériel*, and in accordance with approved arrangements the direct control of all inspection and proof at contractors' works was transferred from the War Office to the Admiralty on 1st April, 1908. The contract arrangements in connection with the supply of naval ordnance and ordnance stores have also been similarly transferred.

Arrangements are being made to provide in Navy Vote 9 for the staff of the Inspector of Steel at Sheffield and elsewhere. This arrangement will take effect from 1st April, 1909.

Ordnance and Torpedo Depôts.

Bedenham.—For the accommodation of ammunition for H. M. ships based on Portsmouth, a new magazine depôt at Bedenham, by Portsmouth Harbour is about to be begun.

FUEL FOR THE FLEET.

During the year much has been done in the direction of improving the Fleet coaling service, viz. :—

Coal.

Steps have been taken to provide a new coaling depôt at Devonport, which will be equipped with grab transporters, similar to those which have given excellent and economical results at Portland.

A number of specially suitable colliers have been continuously engaged on time charter throughout the year, and have materially contributed to the efficient coaling of the Fleet in Home waters.

A scheme has been approved for the reclamation of land, and erection of coal sheds, on the Kowloon side of Hong Kong, which will provide for the more efficient and economical storage of coal at the port.

Arrangements have been made for the storage, under local contracts, of Welsh coal at certain Japanese ports, which have obviated the necessity for the continuous employment of a fleet collier on the China Station. The vessel previously engaged on hire for this service, which has a cargo capacity of 6000 tons, has been purchased by the Admiralty, and is used in Home waters as a mobile depôt.

Oil Fuel.

A number of storage depôts at the Home and Mediterranean ports will be completed and brought into use during the coming year.

Steps have been taken to provide supplies of oil fuel, either in our own tank barges or by local contract, at certain ports around the coast to meet the requirements of the several torpedo flotillas.

Tenders are about to be invited for a new tank steamer to meet the increased need for oil fuel of the destroyer flotillas.

NEW CONSTRUCTION.

Battleships.

The Agamemnon, Lord Nelson, and Bellerophon have been completed and placed in commission.

The trials of the *Temeraire* are in progress, and those of *Superb* will shortly take place. Both of these ships are expected to be ready for commissioning shortly.

The *St. Vincent*, *Collingwood*, and *Vanguard* have been launched and have made good progress so far as the hulls are concerned.

The *Neptune* has been laid down at Portsmouth.

Armoured Cruisers.

The three cruisers of the *Invincible* class have passed successfully through their steam and gun trials, and the speeds obtained on the measured mile have been in all three ships over 26 knots. The *Indomitable* and *Inflexible* have been delivered by the contractors and are in commission. The *Invincible* will, it is anticipated, be delivered before the end of the month.

The *Defence* has successfully passed through her trials and been completed for sea.

The new armoured cruiser *Indefatigable* (an improved *Invincible*) has been laid down at Devonport.

Unarmoured Cruisers.

The new unarmoured cruiser *Boadicea* was launched at Pembroke on 14th May, 1908, and the *Bellona* was laid down shortly afterwards. Five larger vessels of equal speed, but with heavier armament, have been ordered by contract.

The trials of the *Boadicea* have begun.

Destroyers and Torpedo Boats.

Of the twelve first-class torpedo boats (Nos. 13-24) ordered in 1906-7, all have been delivered except Nos. 21, 22 and 24, which were delayed by the recent strike. It is expected that these boats will be delivered very shortly.

Of the twelve first-class torpedo boats ordered in 1907-8 (Nos. 25-36), five have been delivered, and it is expected that the remaining boats will be delivered soon, with the exception of Nos. 33-36, which have been delayed by the strike.

Of the five 33-knot torpedo boat destroyers ordered during 1905-6 three were delivered early in 1908-9. The other two were delayed by the strike, but one has been recently delivered, and the other has satisfactorily completed her steam trials, and her delivery should not be long postponed.

The two similar vessels ordered in 1906-7 are well advanced and

will shortly be ready for sea. The second vessel has not yet carried out her steam trials satisfactorily, but it is hoped she will be completed at an early date.

Five vessels of the Crusader type were ordered in 1907-8 and, with the exception of those delayed by the strike, are well advanced. It is hoped that the whole of these vessels will be delivered during the forthcoming financial year.

Designs were received from 13 firms for the 16 destroyers provided for in the current Navy Estimates, and orders have been placed with nine firms for building them.

The special destroyer Swift ordered in 1905-6 has carried out numerous preliminary speed trials, but has not yet obtained her contract speed.

The difficulties to be overcome in a vessel of such novel type are exceptional, but it is hoped this will be done satisfactorily at an early date.

Submarines.

Satisfactory progress has been made with the construction of the submarines which were in hand last year, and additional orders have been placed both at Chatham and with Messrs. Vickers.

Of the two submarine boats numbered C 17 and C 18, and laid down in March, 1907, whose hulls and engines are being constructed by Chatham Dockyard, the first is now ready for commission, and should be ready in May next. Two others, viz., C 19 and C 20, laid down on 1st June last, are making satisfactory progress and will be completed during the next financial year.

Two further submarine boats of C class have been laid down, and it is hoped that the experience gained with the earlier boats will enable the period of construction for these and any future dockyard-built boats to be shortened.

Other Vessels.

His Majesty's Yacht Alexandra has successfully passed through her trials, been completed for service, and proved to have well met the intentions of the design.

The following harbour service vessels have been completed :—

Grappler, large paddle tug for Portsmouth.

Rover, large twin screw tug for Devonport.

One lighter for Haulbowline.

Six 20-ton ammunition barges.

The following harbour service vessels should be completed next financial year:—

Rambler, large paddle tug for Dover.

Pilot, large twin screw tug for Portsmouth.

Atlas, large twin screw tug and water tank for Hong Kong.

Supply, water tank vessel for Plymouth.

Two self-propelled store lighters for Chatham.

Two store lighters for Sheerness.

Vessels being converted for various Services.

The Vulcan has been completed this year as an armed parent ship for submarines.

The Isla, petrol carrying vessel purchased and modified for the purpose of meeting the latest shore storage arrangements, will be completed next financial year.

The Blake has been converted into a repair and depôt ship for torpedo-boat destroyers and scouts.

The work of fitting the St. George at Chatham as a parent and repair ship for destroyers will shortly be begun.

Plans have been prepared for utilising the old battleship Agincourt as a floating coal depôt, and this work is about to be taken in hand by Chatham Yard.

Plans have been prepared for fitting up in the Royal Fleet Auxiliary Mercedes tanks for use in distributing oil fuel to the vessels of the Fleet, and it has been decided also to build a vessel solely for this purpose. Tenders are being invited, and it is hoped the vessel will be shortly laid down.

Plans have been prepared for fitting up the second-class cruisers Apollo and Andromache for service as mine layers on the same general lines as have been found satisfactory in similar vessels of the same type, and the work is now progressing at Chatham Yard.

MACHINERY AND BOILERS.

The 16 destroyers of the current year's programme will be fitted with turbine machinery as in previous recent vessels of this type, but the boilers have been designed for burning coal instead of oil fuel.

Four effective older first-class torpedo boats have been or are being re-boilered with water-tube boilers, these boilers replacing the locomotive boilers originally fitted.

Following previous practice, large tube water-tube boilers have been or are being installed in all armoured vessels completing or under construction. Water-tube boilers of the small tube type are

being installed in the second-class protected cruisers now being commenced, and also in the *Boadicea* and *Bellona*, and in the torpedo boat destroyers and torpedo boats.

The practice of making of making the principal parts of the main and auxiliary machinery interchangeable, as a whole, in vessels of the same class, has been continued and is being followed where practicable in all vessels at present building or contemplated.

The turbine propelling machinery fitted in Dreadnought, Indomitable, and other ships, and in recent destroyers and torpedo boats, continues to give satisfaction, and propelling machinery of this type is being fitted in all ships now under construction.

Liquid Fuel.

During the year oil-burning appliances have been completed in the armoured vessels *Shannon*, *Minotaur*, *Indomitable*, *Inflexible*, *Agamemnon*, *Lord Nelson*, and in the *Majestic*, *Cæsar*, *Magnificent*, and *Victorious*.

All armoured vessels building are being fitted to burn oil in conjunction with coal in the boilers as an alternative fuel, the full power being obtainable in these vessels by the use of coal only.

Experimental work connected with the burning of oil fuel is still in progress at Haslar, and the instructional work carried out at that establishment, and on board *Fisgard IV.* and *Surly*, has been this year supplemented by instructional work in the Home and Channel Fleets, and satisfactory progress is being made.

LARGE REPAIRS.

The following list shows the most important vessels that have been or are expected to be wholly or partly dealt with in the current financial year:—

Battleships.—*Formidable*, *Implacable*, *Venerable*.

Armoured Cruiser.—*Berwick*.

Protected Cruisers.—*Spartiate*, *Terrible*, *Andromeda*, *Niobe*, *Diadem*, *Forte*, *Doris*, *Medea*.

NEW WORKS.

Works Provided in Estimates 1908-9.

Bermuda.—House for hydraulic engine and boiler. This work will be completed early in next financial year after delivery of machinery.

Cape of Good Hope—Simon's Bay Dockyard Extension.—The dock, penstocks, and caissons are practically finished, while the east breakwater and the reclamation are nearing completion. The east and west piers, the pumping engine and boiler house, and the shops for constructive and engineering departments are well advanced. Dredging is being carried out as necessary.

The steelwork for the coalsheds will shortly be sent out from England, and the work will be proceeded with on its arrival.

Chatham.—The reconstruction of the side walls of the Upnor entrance is completed, and good progress is being made with the extension of No. 4 Dock and the gymnasium at the R.N. barracks.

Coast-guard Signal Stations.—The Horsea Island station is practically finished. At Cleethorpes the signal station is approaching completion. Contracts for Pembroke and Ipswich have been let. Contracts for Aberdeen, Rosyth, and Culver Cliff will be let shortly.

Dover.—Harbour Works.—The Admiralty Pier extension and the reclamation are practically finished. The eastern arm and the south breakwater will be completed in 1909. The necessary dredging is being proceeded with.

Gibraltar.—It has been decided not to provide a new caisson, but to transfer to Gibraltar at a later date the L caisson at Portsmouth, which will be available when the new lock, now being constructed at the latter yard, has been further advanced.

The additional accommodation and improvements at the hospital have been completed.

The police quarters and the railway, &c., from the New Mole to the hospital are in hand.

Harwich (Shotley Point).—The additional hospital accommodation has been completed.

Haulbowline.—The lengthening of the dock is being proceeded with by contract.

Hong Kong.—The new electrical shop, new storehouses, and workshed on west side of New Dock are in hand; the first will be completed in the current financial year, and the two latter in 1909–10. A tender has been accepted for the reclamation at Kowloon coaling dépôt. Arrangements have been made by which the re-provision of War Department buildings becomes unnecessary.

Malta.—The reservoir at Luca is practically completed.

Plymouth.—Keyham Dockyard Extension.—Some of the buildings connected with the scheme, including the torpedo dépôt, have been

erected. Other buildings, *e.g.*, boat house, shops and stores at closed basin, ship fitter's shop, gun-mounting and hydraulic store are being proceeded with. Various incidental services such as railways, paving, bollards, &c., are in hand. The new jetty and railways between Nos. 2 and 3 slips, south yard, have been completed. It is anticipated that renewal of No. 4 dock gates, south yard, will be finished this month. A contract for the caisson between Nos. 2 and 3 basins, north yard, is expected to be let shortly.

Portland.—A contract has been let for rebuilding the outer part of the obat camber.

Portsmouth.—A contract for the new lock has been let, and the work is in hand. The new pay room is approaching completion, and considerable progress has been made with repairs to the old joiners' shop. The infectious hospital at Osborne, and the harbour protection works are also well advanced. A contract for the new joiners' shop will be let shortly. A tender for the gymnasium and swimming bath at the R.N. barracks has been accepted, and the work started. At Haslar hospital the work of reconstructing flats and certain incidental work connected with the lunatic ward are in hand by departmental labour.

A scheme for the new magazines at Bedenham has been decided upon, and drawings and particulars are being prepared with a view to letting a contract.

Rosyth.—*Naval Dépôt.*—The tenders for the main work have been received, and the contract has been placed with Messrs. Easton, Gibb & Sons.

Coaling Facilities and Fuel Storage.—All the schemes for the provision of coaling facilities have been completed, with the exception of sheds at Hong Kong, which are well advanced.

Storage of Oil Fuel.—Contracts have been let for the provision and erection of steel tanks at Gibraltar, Medway, Plymouth, Portsmouth, Portland, Malta, and Haulbowline. The foundations for these tanks are being constructed by departmental labour, and are well advanced.

Accommodation and Storage of Submarines.—The work at Dover is being proceeded with.

The principal new works provided for in 1909-10 are—

Chatham.—Extension of No. 1 boiler shop. Lodge Hill and Chattenden electric light and power installation.

Colombo.—Storage accommodation for coal and naval stores.

Hong Kong.—Victualling yard. Transfer from Hong Kong to Kowloon.

Malta.—Wireless telegraphy station.

Devonport.—Extension of machine shop, south yard. Building for air compressors, &c., near No. 3 slip, south yard. Coaling dépôt, north yard. Additions to electric light and power station. New smithery, north yard.

Portland.—Canteen—additional accommodation.

Portsmouth.—Extension of boiler shop. Re-arrangement of moorings—dolphins. Lengthening No 1 dock. Extension of electric light and power station. R.N. College, Osborne—additional accommodation.

Sheerness.—Extension of rifle range.

Sydney.—Cooling cordite magazines.

PROGRESS UNDER NAVAL WORKS ACT.

(a) *Enclosure and Defence of Harbours.*

Malta Breakwater.—The St. Elmo breakwater is approaching completion, and it is anticipated that the whole of the works will be finished next financial year.

(b) *Adapting Naval Ports to present Needs of Fleet.*

Gibraltar Dockyard Extension.—The residences for officers and artisans are practically finished. Sundry minor buildings and incidental services have been taken in hand, and are generally approaching completion. A catchment area for increasing the water supply is in process of formation.

Hong Kong Dockyard Extension.—The main contract works, including the tidal basin, graving dock, buildings for engineering and constructive departments, &c., have been completed. The works contingent upon the docks comprising culverts, penstock shafts, caisson, &c., are also finished. Incidental services such as drainage, foundations for machinery, electric light and power station, roads, latrines, &c., are completed, or approaching completion.

Colombo Dock.—The dock is completed, but certain subsidiary works are still in hand.

Malta Dockyard Extension.—All the work provided for under this item is completed.

(c) Naval Barracks, &c.

Gunnery Schools.—The new buildings at Chatham and Devonport have been completed.

Magazines.—The two additional cordite magazines at Priddy's Hard, the additional shell stores at Bull Point, and the additional magazine accommodation at Malta have been finished.

Torpedo Ranges.—A contract for a torpedo factory at Gourock has been let and the work commenced. It is expected that a contract will shortly be let for the torpedo range at Arrochar.

Electric Light and Power in Naval Establishments.—The whole of the installations provided for under this item have been completed.

R. McK.

March 10th, 1909.

STATEMENT showing the NET EXPENDITURE from NAVY VOTES and LOANS on account of NAVAL SERVICES for the Years 1901-2 to 1907-8, together with the ESTIMATES for 1908-9 and 1909-10.

Year.	Total Expenditure from Navy Votes (Net). (1)	Annuity in Repayment of Loans under the Naval Works Acta. (2)	Total Expenditure exclusive of Annuity [Column (2) deducted from Column (1).] (3)	Expenditure from Loans under Naval Works Acta. (4)	Total of Columns (3) and (4). (5)	Expenditure on New Construction (Vote 8). (6)
1901-2	£ 30,981,315	£ 122,255	£ 30,859,060	£ 2,745,176	£ 33,604,236	£ 8,865,080
1902-3	31,003,977	297,895	30,706,082	3,198,017	33,904,099	8,534,917
1903-4	35,709,477	502,010	35,207,467	3,261,083	38,468,550	11,115,733
1904-5	36,859,681	634,238	36,225,443	3,402,575	39,628,018	11,263,019
1905-6	33,151,841	1,015,812	32,136,029	3,313,604	35,449,633	9,688,044
1906-7	31,472,087	1,094,309	30,377,778	2,431,201	32,808,979	8,861,897
1907-8	31,251,156	1,214,403	30,036,753	1,083,663	31,120,416	7,832,689
1908-9 (estimated)	32,319,500	1,264,032	31,055,468	948,262	32,003,730	7,545,202
1909-10 (estimated)	35,142,700	1,330,356	33,812,344	—	33,812,344	8,885,194

Abstract of Navy

Votes.		Estimates.	
		Gross Estimate.	Appropriations in Aid.
	I.—NUMBERS.		
A.	Total Number of Officers, Seamen, Boys, Coast-guard, and Royal Marines	128,000	...
	II.—EFFECTIVE SERVICES.		
		£	£
1	Wages, &c., of Officers, Seamen and Boys, Coast-guard, and Royal Marines	7,432,949	152,749
2	Victualling and Clothing for the Navy	2,985,631	568,831
3	Medical Establishments and Services	279,734	21,034
4	Martial Law	12,820	120
5	Educational Services	223,673	64,573
6	Scientific Services	96,818	29,518
7	Royal Naval Reserves	376,527	9,527
8	Shipbuilding, Repairs, Maintenance, &c. :		
	Section I.— <i>Personnel</i>	3,169,700	21,500
	Section II.— <i>Matériel</i>	4,765,100	373,000
	Section III.—Contract Work	8,443,370	165,070
9	Naval Armaments	2,521,000	140,000
10	Works, Buildings, and Repairs at Home and Abroad	2,950,300	34,000
11	Miscellaneous Effective Services	452,300	13,500
12	Admiralty Office	386,975	8,775
	Total Effective Services	£ 34,097,097	1,602,197
	III.—NON-EFFECTIVE SERVICES.		
13	Half-Pay and Retired Pay	905,201	15,001
14	Naval and Marine Pensions, Gratuities, and Com- passionate Allowances	1,410,482	22,682
15	Civil Pensions and Gratuities	370,210	410
	Total Non-Effective Services	£ 2,685,893	38,093
	GRAND TOTAL	£ 36,782,990	1,640,290

NOTE.—Provision to the extent of £641,700 is included in the Estimates for 1909-1910 under Votes 8, 10 and 12, Acts, 1895 to 1905.

Estimates for 1909-1910.

1909-1910.	Estimates, 1908-1909.			Difference on Net Estimates.		Votes.
	Gross Estimate.	Appropriations in Aid.	Net Estimate.	Increase.	Decrease.	
Net Estimate.						
Total Numbers.			Total Numbers.	Numbers.	Numbers.	A.
128,000	128,000	...	128,000	...	...
£	£	£	£	£	£	
7,280,200	7,266,217	136,517	7,129,700	150,500	...	1
2,416,800	2,862,071	575,671	2,286,400	130,400	...	2
258,700	278,962	20,262	258,700	...	...	8
12,700	14,000	100	13,900	...	1,200	4
159,300	230,441	63,441	167,000	...	7,700	5
67,300	95,195	29,195	66,000	1,300	...	6
367,000	376,584	8,284	368,300	...	1,300	7
						8
3,148,200	2,958,000	21,800	2,936,200	212,000	...	Sec. I.
4,392,100	4,539,000	382,000	4,157,000	235,100	...	Sec. II.
8,278,300	7,357,700	137,000	7,220,700	1,057,600	...	Sec. III.
2,381,000	2,208,700	160,000	2,048,700	332,300	...	9
2,916,300	2,340,700	84,000	2,306,700	609,600	...	10
438,800	421,607	12,407	409,200	29,600	...	11
378,200	378,975	8,775	370,200	8,000	...	12
32,494,900	31,328,152	1,589,452	29,738,700	2,766,400	10,200	
890,200	881,618	12,818	868,800	21,400	...	13
1,387,800	1,354,393	19,793	1,334,600	53,200	...	14
369,800	377,840	440	377,400	...	7,600	15
2,647,800	2,613,851	33,051	2,580,800	74,600	7,600	
35,142,700	33,942,003	1,622,503	32,319,500	2,841,000	17,800	
Net Increase				£2,823,200		

for the continuation of services originally provided for out of funds raised under the authority of the Naval Works

STATEMENT of the Principal Points of DIFFERENCE between the
ESTIMATES of 1908-1909 and those for 1909-1910.

INCREASES.		£
Wages, &c., of Officers, Seamen and Marines		165,000
Victualling and Clothing for the Navy		135,000
Scientific Services		1,800
Wages of Artificers and Police in Dockyards		203,370
Naval Stores, &c.		223,200
Decrease in Amount of Receipts arising from the Sale of Old Ships		6,000
Decrease in Amount of Receipts arising from the Sale of Unserviceable Naval Stores, Machinery, Gun Mountings, &c.		14,530
Propelling Machinery for His Majesty's Ships and Vessels (Contract)		764,169
Hulls of Ships (Contract)		697,848
Repairs and Alterations by Contract of Ships, &c.		12,500
Inspection of Contract Work		15,000
Purchase of Ships, Vessels, &c.		10,000
Wages of Artificers and Police in Naval Ordnance Establishments		12,620
Guns		141,000
Projectiles and Ammunition		70,000
Torpedoes and Gun-cotton		59,400
Small Arms, Maintenance of Naval Ordnance Vessels, and Miscellaneous Naval Ordnance Stores		24,200
Inspection, Proof, Experiments, &c., in connection with Naval Ordnance Stores		4,000
Decrease in Amount of Receipts arising from the Sale of Unserviceable Naval Ordnance Stores		20,824
Works, Buildings, and Repairs		609,600
Miscellaneous Effective Services		31,800
Non-Effective Services		72,000
Miscellaneous Increases		11,886
		£ 3,304,747
DECREASES.		£
Educational Services		7,700
Auxiliary Machinery for His Majesty's Ships and Vessels (Contract)		46,002
Armour for His Majesty's Ships and Vessels (Contract)		252,502
Gun Mountings and Air-Compressing Machinery (Contract)		90,343
Machinery, &c., for His Majesty's Shore Establishments (Contract)		25,000
Increase in Contribution by the Dominion of New Zealand in aid of Naval Expenditure		60,000
		481,547
Net Increase		£ 2,823,200

STATEMENT showing the Total Estimated EXPENDITURE for the NAVAL SERVICE, including Amounts provided in the NAVY ESTIMATES, as well as in the CIVIL SERVICE and other ESTIMATES, for the following Services:—

	1909-1910.	1908-1909.
NAVY ESTIMATES:	£	£
Estimated Expenditure (after deducting Appropriations in Aid) . . .	35,142,700	32,319,500
CIVIL SERVICE ESTIMATES: (a)		
Estimated Expenditure under—		
Class I. Vote 9.—Public Buildings, Great Britain:		
Maintenance and Repairs, including) £		
New Works, Alterations, &c.	35,600	
Rents, Insurance, Tithes, &c.	10,450	
Fuel, Light, Water, &c.	5,850	
Furniture	4,300	
	56,200	55,880
Class I. Vote 10.—Surveys of the United Kingdom	3,450	2,850
„ I. „ 13.—Rates on Government Property	136,000	135,400
„ I. „ 14.—Public Works and Buildings, Ireland:		
Coast-guard, viz.:	£	
Purchase of Sites	—	
New Works and Alterations, including)	1,530	
Naval Reserve Stations		
Maintenance and Supplies	4,515	
	£6,045	
Naval Reserve, viz.:		
Maintenance and Supplies	128	
	6,173	7,522
Class II. Vote 8.—Board of Trade:		
Staff and Incidental Expenses in connection with		
the Royal Naval Reserve Force	3,993	4,000
„ II. „ 9.—Mercantile Marine Services:		
Staff and Incidental Expenses in connection with		
the Royal Naval Reserve Force	2,850	3,000
„ II. „ 14.—Exchequer and Audit Department (Cost of		
Audit):	£	
Navy Cash Accounts	9,188	
Expense and Manufacturing Ac- counts	5,748	
Store Accounts	6,026	
	20,962	20,897
Class II. Vote 23.—Stationery and Printing	102,000	100,000
„ III. „ 1.—Law Charges, England	10,824	9,478
Maintenance of Naval Prisoners:		
„ III. „ 8.—Prisons, England and the Colonies	2,916	3,456
„ III. „ 14.—Prisons, Scotland	120	120
„ III. „ 21.—Prisons, Ireland	373	379
REVENUE DEPARTMENT ESTIMATES:		
Vote 1.—Customs.—Percentage for provision of funds for District Pay-		
masters of the Coast-guard	154	160
Vote 1.—Customs.—Staff and Incidental Expenses in connection with		
the Royal Naval Reserve Force	3,300	3,300
Vote 1.—Customs.—Analysis of Food, &c.	300	300
Vote 3.—Post Office.—Postage of Official Correspondence (in-		
cluding Parcels)	£ 22,500	
Vote 3.—Post Office Telegraphs.—Official Telegrams and Ex-		
penses in connection with Telegraphs (Admiralty	22,450	
Wires, and Services of Clerks)		
	44,950	36,000
Total	£ 35,537,265	32,702,242

Note.—In addition to the Services shown above, an annuity of £16,243 18s. is payable to the Commissioners of Woods, &c. from the Consolidated Fund, under the Public Offices Sites Act of 1892 (45 & 46 Vict. c. 32).

(a) Provision is also made in the Estimate for Osborne (Class I., Vote 2) for expenditure in connection with the treatment of invalid Officers of the Navy in the Convalescent Home at Osborne.

STATEMENT showing the CONTRIBUTIONS from INDIA and the COLONIES towards NAVAL EXPENDITURE.

RECEIVED FROM.	NATURE OF SERVICE.	VOTE.														TOTAL.
		1	2	3	6	7	8			9	11	12	13	14	15	
							Section I.	Section II.	Section III.							
India	Maintenance of His Majesty's Ships in Indian Waters	£ 28,000	£ 9,100	£ 500	£ ..	£ ..	£ 12,500	£ 10,200	£ 13,000	£ 11,600	£ 2,500	£ ..	£ 4,300	£ 8,300	£ ..	£ 100,000
	Indian Troop Service (on account of work performed by the Admiralty) . . . .	..	..	..	..	..	..	..	..	..	..	3,050	..	..	850	3,400
Australian Commonwealth	Survey of the N.-W. coast of Australia . .	2,400	800	..	300	..	100	1,000	..	..	..	..	..	..	..	4,600*
	Maintenance of an Australasian Squadron and the establishment of a branch of the Royal Naval Reserve	72,500	22,900	700	..	6,300	..	38,400	118,700	6,900	8,700	..	10,600	14,300	..	200,000
Dominion of New Zealand	Maintenance of an Australasian Squadron and of the Imperial Navy generally, also for the establishment of a branch of the Royal Naval Reserve	10,200	4,200	..	..	..	4,500	8,400	13,000	5,700	..	..	..	..	..	46,000
Cape Colony	General maintenance of the Navy	7,700	3,200	..	..	..	3,400	6,400	9,900	4,400	..	..	..	..	..	35,000
Natal	Maintenance of a branch of the Royal Naval Reserve . . . .	..	..	..	..	3,000	..	..	..	..	..	..	..	..	..	3,000
Newfoundland . . .	Naval Reserve . . . .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Total	113,000	40,000	1,200	800	9,300	20,900	64,000	164,000	25,000	11,000	8,000	14,000	28,600	300	402,000

* A contribution of £7,000 annually is payable as a maximum, of which amount it is estimated that £2,000 only will be payable in 1909-1910.

VOTE (A).

NUMBERS of OFFICERS, SEAMEN and BOYS, COAST-GUARD, and ROYAL MARINES Borne on the Books of His Majesty's Ships, and at the ROYAL MARINE DIVISIONS.

One Hundred and Twenty-eight Thousand.
(128,000.*)

I.—SEA SERVICE.

Under which Vote Provided.	RANKS, &c.	NUMBERS, ALL RANKS.				Num- bers of all Ranks borne on 1st January, 1909.
		1909-1910.		1908-1909.		
Vote 1	FOR HIS MAJESTY'S FLEET :					
	Flag Officers	28		26		
	Commissioned Officers . . .	4,688		4,618		
	Subordinate Officers . . .	615		638		
	Warrant Officers	1,762		1,767		
	Petty Officers and Seamen . .	91,978		91,315		
	Boys (Service)	1,794		1,634		
			100,865		99,998	99,170
	COAST-GUARD :					
	Commissioned Officers . . .	103		103		
	Chief Officers and Second Mates.	230		230		
	Petty Officers and Seamen . .	2,934		3,207		
			3,267		3,540	3,490
	ROYAL MARINES (for Service Afloat and on Shore):					
	Commissioned Officers . . .	457		458		
	Warrant Officers	45		44		
	Staff Sergeants and Sergeants .	1,329		1,370		
	Band Ranks, Buglers and Musicians	1,607		1,426		
	Rank and File	13,915		14,645		
	Band Boys	250	(a) 17,603	403	18,346	18,048
			121,735		121,884	120,708
	Total					
	Net Decrease		149			

* Average for the year.

(a) Including 30 officers, &c., Sub-Heads F and H.

VOTE (A)—*continued.*

II.—OTHER SERVICES.

Under which Vote Provided.	RANKS, &c.	NUMBERS, ALL RANKS.		Numbers of all Ranks borne on 1st January, 1909.
		1909-1910.	1908-1909.	
Vote 1	Naval Cadets	784	784	4,418 4,878
	Engineer Cadets	23	55	
	Pensioners in Home Ships, &c.	395	416	
	Boys under Training—			
	Seaman Class	2,860	2,630	
Vote 2	Artificer Class	520	533	
		4,582		
	For Victualling and Clothing for the Navy	1	3	
	Vote 3 { For Medical Establishments and Services	567	554	
	Vote 4 For Martial Law	17	23	
	Vote 5 For Educational Services	558	576	
	Vote 6 For Scientific Services	12	10	
	Vote 7 For Royal Naval Reserves	58	54	
	Vote 8 { For Shipbuilding, Repairs, Maintenance, &c. :			
	Section I.	231	241	
	Section II.	29	27	
	Section III.	79	74	
	Vote 9 For Naval Armaments	68	67	
	Vote 10 { For Works, Buildings, and Repairs, at Home and Abroad . . . . .	..	..
	Vote 11 { For Miscellaneous Effective Services . . . . .	..	1
Vote 12	For Admiralty Office	63	68	
		1,683	1,698	1,692
	Total	(c) 6,265	6,116	6,570
	Net Increase	149		
	Total, Sea Service	121,735	121,884	
	" other Services	6,265	6,116	
		128,000	128,000	

No Variation in Total.

(b) Including 12 officers, Sub-Head H.

(c) Including Officers, Seamen and Service Boys	2,330	..	2,343
" Retired Officers and Pensioners (Vote 1).	993	..	416
" Boys (Training, Seaman Class)	2,860	..	2,630
" Boys (Training, Artificer)	520	..	533
" Boys (Training, Artisan)	44	..	77
" Royal Marines	116	..	117
	6,265	..	6,116

VOTE 8.

SHIPBUILDING, REPAIRS, MAINTENANCE, &c.

I.—ESTIMATE of the SUM which will be required, in the YEAR ending 31st March, 1910, to defray the EXPENSES of SHIPBUILDING, REPAIRS, MAINTENANCE, &c., including the COST of ESTABLISHMENTS of DOCKYARDS and NAVAL YARDS at HOME and ABROAD.

DOCKYARD WORK.

SECTION I.—PERSONNEL.—Three Million One Hundred and Forty-eight Thousand Two Hundred Pounds.

(£3,148,200.)

SECTION II.—MATÉRIEL.—Four Million Three Hundred and Ninety-two Thousand One Hundred Pounds.

(£4,392,100.)

CONTRACT WORK.

SECTION III.—CONTRACT WORK.—Eight Million Two Hundred and Seventy-eight Thousand Three Hundred Pounds.

(£8,278,300.)

(Total of the Three Sections of Vote 8 . . . £15,818,600.)

II.—SUB-HEADS under which SECTION I., PERSONNEL, of this VOTE will be accounted for.

	ESTIMATES.		Increase.	Decrease.
	1909-1910.	1908-1909.		
DOCKYARD WORK.				
SECTION I.—PERSONNEL.				
<i>Dockyards at Home.</i>				
	£	£	£	£
A.—Salaries and Allowances	(a) 235,562	227,736	7,826	..
B.—Wages, &c., of Men, and hire of Teams	2,342,368	2,193,155	149,213	..
C.—Wages, &c., of Police Force	51,676	51,211	465	..
D.—Contingencies	2,800	2,400	400	..
<i>Naval Yards Abroad.</i>				
E.—Salaries and Allowances	(a) 106,777	106,423	354	..
F.—Wages, &c., of Men, and hire of Teams	409,075	356,528	52,547	..
G.—Wages, &c., of Police Force	20,892	19,747	1,145	..
H.—Contingencies	550	800	..	250
	£ 3,169,700	2,958,000	211,950	250
<i>Deduct,—</i>			<i>Add,—</i>	
L.—Appropriations in Aid	21,500	21,800	300	..
	£ 3,148,200	2,936,200	212,250	250
Net Increase			£212,000 (b)	

(a) These amounts include the sums of £37,627 for pay of Inspectors of Trades and Senior Draughtsmen at Home and £14,225 for pay of Inspectors of Trades Abroad, which is charged direct to the cost of shipbuilding.

(b) This Vote is increased by a sum of £3,835 in respect of Dockyard Labour on Fixed Machinery originally provided for by advances under the Naval Works Acts, 1895 to 1905.

Note.—Provision has been made for New Construction in the above Vote to the extent of—

Section 1	£763,700
„ 2	604,600
„ 3	7,516,894

£8,885,194

The difference (£93,241) between the provision under Section III. of the Vote (£7,516,894) and the amount shown in the Programme (£7,423,653) is due to the estimated withdrawals from Stock of transferable auxiliary machinery, gun mountings and steamboats during the year being less than the cash payments for like articles brought into Stock in the same period.

VOTE 8.—SHIPBUILDING, REPAIRS, MAINTENANCE, &c.—*continued.***II.**—SUB-HEADS under which SECTION II., MATÉRIEL, of this VOTE will be accounted for.

	ESTIMATES.		Increase.	Decrease.
	1909-1910.	1908-1909.		
DOCKYARD WORK—<i>continued.</i>				
SECTION II.—MATÉRIEL.				
<i>Naval Stores, &c.</i>	£	£	£	£
A.—Timber, Masts, Deals, &c. . . .	148,000	152,000	..	4,000
B.—Metals and Metal Articles . . .	974,400	920,500	53,900	..
C.—Coal for Yard purposes . . .	129,000	158,000	..	29,000
D.—Hemp, Canvas, &c. . . .	171,000	136,000	35,000	..
E.—Paint Materials, Oils, Pitch, Tar, Tallow, Boats, Furniture, and other Miscellaneous Articles . . .	719,000	552,000	167,000	..
F.—Electrical, Torpedo, and other Apparatus	460,200	439,000	21,200	..
G.—Freight	45,000	50,000	..	5,000
H.—Rents, Water, &c., Dockyards at Home, and Naval Yards Abroad }	84,700	37,600	..	2,900
I.—Gas, Electric Light, &c., Dockyards at Home and Naval Yards Abroad. }	16,500	19,900	..	3,400
<i>Deduct,—</i>	£ 2,697,800	2,465,000	277,100	44,300
J.—Appropriations in Aid. . . .	333,000	352,000	..	19,000
	£ 2,364,800	2,113,000	277,100	25,300
<i>Fuel, &c., for the Fleet.</i>				
K. I.—Fuel, Lubricating Oils, &c., for the Fleet	1,748,300	1,822,000	..	73,700
K. II.—New Craft and Machinery for Coaling, &c.	120,000	67,000	53,000	..
K. III.—Salaries, Wages, and Allowances	125,000	122,000	3,000	..
K. IV.—Maintenance of Craft for Coaling, &c., and incidental expenses }	74,000	63,000	11,000	..
<i>Deduct,—</i>	£ 2,067,300	2,074,000	67,000	73,700
L.—Appropriations in Aid . . .	40,000	30,000	10,000	..
	£ 2,027,300	2,044,000	57,000	73,700
	£ 4,392,100	4,157,000	334,100	99,000
	Net Increase . . .		£235,100 (a)	

(a) This Vote is increased by a sum of £1,195 under Naval Stores, and of £20,000 under Sub-Head K. II. in respect of Fixed Machinery originally provided for by advances under the Naval Works Acts, 1895 to 1903.

VOTE 8.—SHIPBUILDING, REPAIRS, MAINTENANCE, &c.—*continued*.

II.—SUB-HEADS under which SECTION III., CONTRACT WORK, of this VOTE will be accounted for.

	ESTIMATES.		Increase.	Decrease.
	1909-1910.	1908-1909.		
SECTION III.—CONTRACT WORK.				
	£	£	£	£
A.—Propelling, &c., Machinery for His Majesty's Ships, Vessels, &c. }	3,028,577	2,264,408	764,169	..
B.—Auxiliary Machinery, &c., for His Majesty's Ships, Vessels, &c. }	170,968	216,970	..	46,002
C.—Hulls of Ships, &c., Building by Contract }	1,954,922	1,257,074	697,848	..
D.—Armour for His Majesty's Ships and Vessels }	997,164	1,249,666	..	252,502
E.—Repairs and Alterations by Contract of Ships, &c., and their Machinery and Stores }	90,000	77,500	12,500	..
F.—Inspection of Contract Work }	90,000	75,000	15,000	..
G.—Gun Mountings and Air-Compressing Machinery }	1,646,739	1,737,082	..	90,343
H.—Machinery, &c., for His Majesty's Shore Establishments at Home and Abroad }	225,000	250,000	..	25,000
H.H.—Fixed Machinery, formerly provided for by Advances under the Naval Works Acts, 1895 to 1905 . }	50,000	50,000	..	..
I.—Royal Reserve of Merchant Cruisers.	150,000	150,000	..	..
K.—Purchase of Ships, Vessels, &c. }	40,000	30,000	10,000	..
Deduct,—	£ 8,443,370	7,357,700	1,499,517	418,847
L.—Appropriations in Aid }	165,070	137,000	28,070	..
£	8,278,300	7,220,700	1,471,447	418,847
Net Increase .			£1,057,600 (a)	

(a) This Vote is increased by a sum of £50,000 (Sub-Head H.H.) in respect of Fixed Machinery originally provided for by advances under the Naval Works Acts, 1895 to 1905.

PROGRAMME of

PROGRAMME of the ESTIMATED EXPENDITURE in CASH, and in NET
MAINTENANCE, &c., in
(Exclusive of the FLEET

SUB-HEADS under which this ESTIMATED EXPENDITURE will be
provisions of Section 1 (2), ARMY

	ESTIMATED EXPENDITURE IN			
	Direct Expenditure.			
	Dockyard Work.		Contract Work, Sec. III.	Total Direct Expenditure (A)
	Personnel, Sec. I.	Matériel, Sec. II.		
NEW CONSTRUCTION:	£	£	£	£
A.—DOCKYARD-BUILT SHIPS—			(f)	
Hulls, &c. (c)	668,975	533,235	1,505,087	2,707,297 1
Machinery	42,620	17,690	919,738	980,048 2
	711,595	550,925	2,424,825	3,687,345 3
B.—CONTRACT-BUILT SHIPS—			(g)	
Hulls, &c. (c)	20,000	37,680	2,816,597	2,874,277 4
Machinery . . . .	..	..	2,029,752	2,029,752 5
	20,000	37,680	4,846,349	4,904,029 6
C.—SMALL VESSELS (d) . .	32,105	15,995	152,479	200,579 7
TOTAL NEW CONSTRUCTION	763,700	604,600	7,423,653	8,791,953 8
D.—REPAIRS, ALTERATIONS, &c. .	1,408,795	764,600	400,267	2,573,662 9
E.—STORES, FOR MAINTENANCE, &c. . . . .	..	933,400	..	933,400 10
F.—ESTABLISHMENT, INCIDENT- TAL, AND MISCELLANEOUS CHARGES, UNAPPROPRIATED .	..	..	..	.. 11
TOTAL	£ 2,172,495	2,302,600	7,823,920	12,299,015 12

(c) Including Hydraulic and Transferable Gun Mountings, &c.

(d) Including Harbour Craft, and excluding Torpedo Boats, &c., the value of which is included under other Sub-Heads.

(e) Exclusive of £16,000 provided under Vote 2 for new Lighters for Victualling Yard Service, £5,400 provided under Vote 9 for New Vessels for Naval Ordnance Store Service, £4,500 provided under Vote 10 for New Craft for Works Department, and £58,000 for Coaling Craft, Vote 8, Section 2, Sub-Head K.

(f) Including £609,000 for Armour.

(g) Including £378,184 for Armour.

VALUES OF STORES issued for SHIPBUILDING, REPAIRS, ALTERATIONS, the Year 1909-1910.

COALING SERVICE.)

accounted for in the NAVY EXPENSE ACCOUNTS, under the AND NAVY AUDIT ACT, 1889.

1909-1910.		EXPENDITURE AS ESTIMATED IN NAVY ESTIMATES, 1908-1909.			Difference between Direct Expenditure, 1908-1909 (B) and 1909-1910 (A).	
Establish- ment, &c., Charges, ap- portioned.	Aggregate, 1909-1910.	Direct Ex- penditure. (B)	Establish- ment, &c., Charges, ap- portioned.	Aggregate, 1908-1909.	Increase.	Decrease.
£	£	£ (A)	£	£	£	£
1 224,101	2,931,393	2,678,253	216,658	2,894,911	29,044	..
2 29,455	1,009,503	906,906	31,352	938,258	73,142	..
3 253,556	3,940,901	3,585,159	248,010	3,833,169	102,186	..
4 66,517	2,940,794	2,456,962	57,730	2,514,692	417,315	..
5 42,748	2,072,500	1,381,681	31,066	1,412,747	648,071	..
6 109,265	5,013,294	3,638,643	88,796	3,927,439	1,065,366	..
7 10,292	210,871	123,705	6,827	130,532	76,874	..
8 373,113	9,165,066	7,547,507	343,633	7,891,140	1,244,446	..
		2,494,027 *132,420		2,828,319 *132,420		
9 316,435	2,890,007	2,626,447	334,292	2,960,739	..	52,785
10 84,530	1,017,930	877,700 *36,438	85,884	963,584 *36,438	55,700	..
774,078		914,138	768,809	1,000,022		
			2,067,828 *95,982	2,067,828 *95,982		
11 2,408,912	2,408,912	..	1,971,846	1,971,846	..	..
12 3,163,990	15,482,005	11,051,654	2,735,655	13,787,309	..	..

NET INCREASE ON DIRECT EXPENDITURE . . . £1,247,361

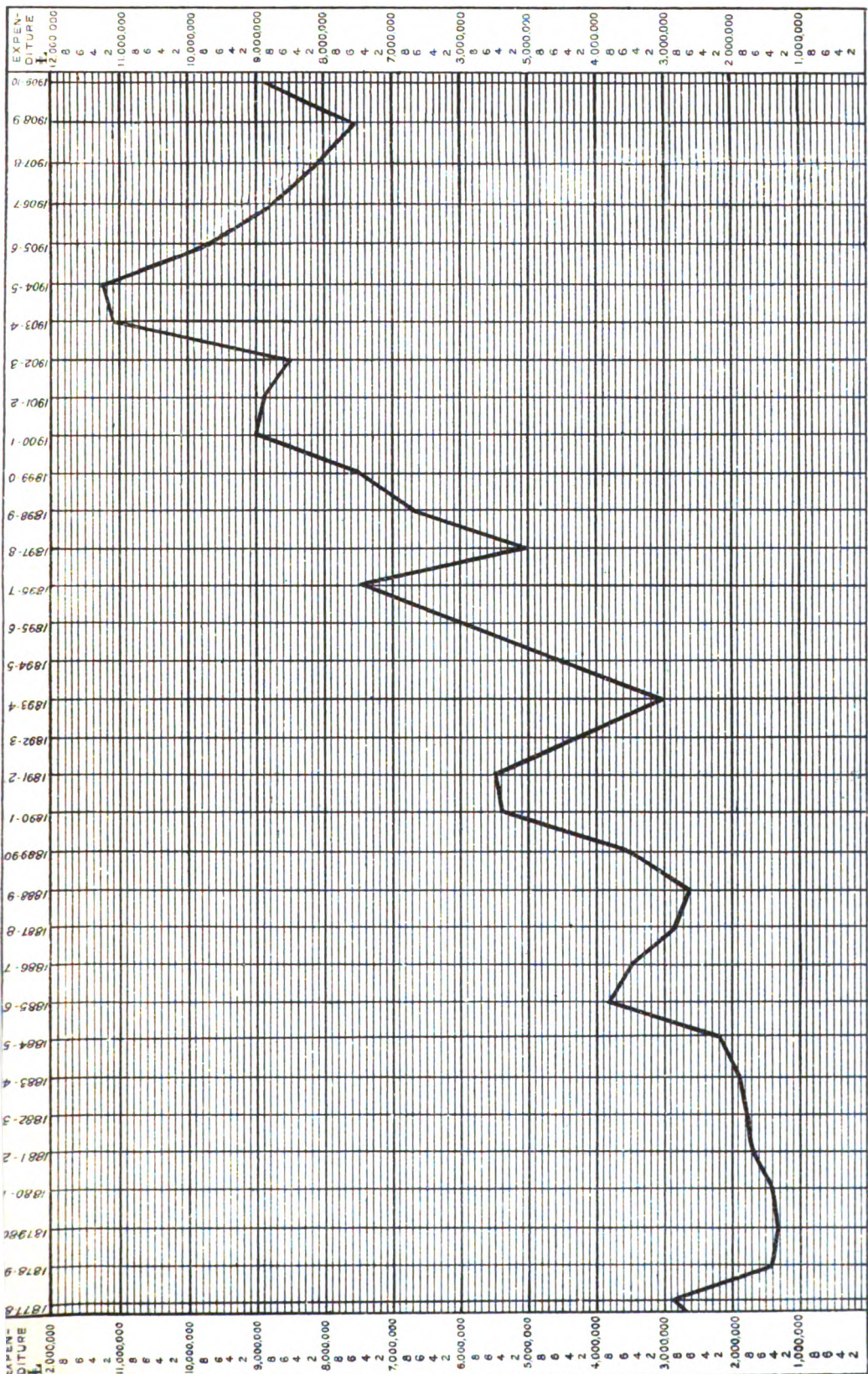
(A) Including £209,576 for Armour.

(i) Including £433,090 for Armour.

* Estimated expenditure on account of "Other Naval Services" provided for in 1909-10 under Sub-Head D.

RECAPITULATION OF ESTIMATED EXPENDITURE.

SUB-HEADS OF EXPENDITURE.	Total Direct Expenditure.	Establishment, etc., Charges Appropriated.	New Construction.	Repairs, Alterations, etc.			Sea Stores, etc.	Establishment, Incidental, and Miscellaneous Charges Unappropriated.		Aggregate, 1909-10.
				Ships for Reliefs or Re-commis- sion.	Ships in Commission and Reserve.	Other Naval Services.		£	£	
DOCKYARD WORK:	£	£	£	£	£	£	£	£	£	£
Section I.— <i>Personnel</i> .	2,172,495	1,176,083	892,082	471,006	1,048,247	77,722	56,382	498,172	304,967	3,348,578
Section II.— <i>Material</i> .	2,302,600	1,398,425	692,983	244,823	572,389	68,609	961,548	805,944	601,579	3,701,025
CONTRACT WORK:										
Section III. . .	7,823,920	608,482	7,580,001	55,220	293,535	58,546	..	198,250	..	8,432,402
Total Estimated Expen- diture for 1909-1910)	12,299,015	3,182,990	9,165,066	771,049	1,914,171	204,877	1,017,930	1,502,366	906,546	15,482,005
Totals of Sub-Heads £	15,482,005	9,165,066	9,165,066	2,890,087			1,017,930	2,408,912		15,482,005



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LIST of NEW SHIPS and VESSELS Estimated to be Passed into COMMISSION during the Years 1909-1910 and 1908-1909.

1909-1910.				1908-1909.			
NAME OF SHIP.	Load Displacement in Tons.	Estimated Horse Power.	Number of Guns.	NAME OF SHIP.	Load Displacement in Tons.	Estimated Horse Power.	Number of Guns.
ARMoured SHIPS.				ARMoured SHIPS.			
Collingwood . . .	19,250	24,500	10	Bellerophon . . .	18,600	23,000	10
St. Vincent . . .	19,250	24,500	10	Agamemnon . . .	16,500	16,750	14
Vanguard. . . .	19,250	24,500	10	Lord Nelson . . .	16,500	16,750	14
Temeraire	18,600	23,000	10	Invincible	17,250	41,000	8
Superb	18,600	23,000	10	Inflexible	17,250	41,000	8
				Indomitable . . .	17,250	41,000	8
				Defence	14,600	27,000	14
UNARMoured SHIP.				UNARMoured SHIPS.			
Bellona	3,360	18,000	..	Alexandra	2,050	4,500	..
Boadicea	3,300	18,000	6				
TORPEDO CRAFT.				TORPEDO CRAFT.			
Swift	1,800 (estimated)	30,000	4	TORPEDO BOAT DESTROYERS . } 6	..	Various	3 (each)
TORPEDO BOAT DESTROYERS . } 8	..	Various	{ One 3 Seven 2 (each)				
FIRST-CLASS TORPEDO BOATS . } 6	..	Various	2 (each)	FIRST-CLASS TORPEDO BOATS . } 17	..	Various	2 (each)
SUBMARINE BOATS 15	..	..	..	SUBMARINE BOATS 7	..	..	..

NAVY ESTIMATES, 1909-10.

SPEECH OF THE FIRST LORD ON THE MOTION TO GO INTO
COMMITTEE OF SUPPLY ON THE NAVY ESTIMATES.

House of Commons, March 16th, 1909.

MR. McKENNA, who was received with cheers, said:—The Estimates which I have to present to Parliament amount to £35,142,700, an increase of £2,823,200 over the Estimates of the current year. For the first time for many years there will be no expenditure on loans under the Naval Works (Loan) Act. On the other hand, the charge for annuities in repayment of loans amounts to no less than £1,330,356. From the statement which has been published with the Estimates a calculation has been made covering a period of nine years of the net expenditure on Navy Votes, after deducting the loan charges, and to this figure has been added the expenditure on loans. The result shows that the estimated expenditure on this basis for the next financial year is less than in 1903-4 by £4,656,000, and less than expenditure in 1904-5 by £5,816,000. The increase for the current year on that basis is £1,809,000. A further observation has to be made on the apparent increase of expenditure. For some years surplus stocks have been utilised without replacement, and to that extent the Estimates have been relieved for the time being. In the current year this relief amounted to £500,000. In 1909-10 the value of stocks which could be utilised under similar conditions amount to £156,000, thus causing an addition to the cash provision of the Estimates of £344,000. There are, moreover, certain automatic increases of the Navy Estimates—Votes 1, 13, 14—over which the Board of Admiralty have no control. These amount in 1909-10 to £142,000. The total of these two items amounts to £486,000. If this be deducted from the figure of £1,809,000, which I have shown is the increase for the current year, after making allowance for loan expenditure and loan charges, the resultant increase of controllable expenditure is reduced to £1,323,000.

PEACE, RETRENCHMENT, AND REFORM.

After making all allowances, distinguishing, as I have done, between the true and the apparent expenditure of the current year, I should be the first to admit that the present Estimates are such as

require the strongest justification before Parliament should be asked to vote them. During the last few weeks a number of friends of the Government have reminded me, anticipating, I suppose, the increase of the vote next year, that the policy of the present Government has been declared to be one of peace, retrenchment, and reform. I agree most cordially with the policy, and I can well understand that any addition to the naval expenditure may be viewed with the greatest alarm by many persons whose political convictions I share and whose good opinion I greatly value. As I have said, the Estimates for 1909-10 show an increase of £2,823,000 over those of the current financial year. They further give notice to Parliament that the Government recognise the existence of certain circumstances which may, later in the year, call upon them to sanction the ordering of the component parts of four more battleships beyond the four for which alone money provision is made in the Estimates. Such proposals cannot fail to be regarded as of exceptional gravity from the financial point of view—a novel but actual and potential programme of shipbuilding which not only throws an additional charge on the Estimates for the coming financial year, but necessarily entails further increase in the year 1910-11. No one can suppose that the present Government have made themselves responsible for Estimates on such a scale with a light heart. If I may speak of myself for a moment, it would be to say that there is no man in this House who is more earnestly desirous of retrenchment on armaments than I am, or more reluctant to have forced upon him, by the circumstances of the time, so burdensome a programme. My first experience of official life was at the Treasury. In that admirable Department I learnt the theory and practice of economy. If I find myself in a situation which is above my pretensions, I recognise, I believe, that I owe it to the fact that I am known to adhere to the principles which I learnt in my first office.

THE SAFETY OF THE EMPIRE.

But there are occasions when even the most determined economist is willing to make a sacrifice. The safety of the Empire stands above all other considerations. No matter what the cost, the safety of the country must be assured. As the House will have already seen in the statement which has been furnished with the Estimates, the particular item of increase in 1909-10 is the Vote for new construction. Financial provision is made for laying down two large battleships in July and two more in November. This of itself, without regard to the further contingent order, of which I have spoken, is already a great advance upon the programme which was accepted last

year by the House of Commons. What has happened in the interval to lead to such an increase of the scheme of shipbuilding that was accepted a year ago by Parliament as adequate, and proposed with general acceptance by this Government? I will answer this question in a moment. But before I do so let me make one general observation on which I do not think there can be any disagreement. It will be regarded as axiomatic that our island position, the extent and dispersion of our Empire, and the magnitude of our trade, oblige us, so long as we are equal to the task, to maintain a Navy adequate in strength to insure our shores from invasion, our Empire from hostile attempts, and our trade from destruction in war. It follows from this that we cannot determine in advance any definite limits to our Navy. These limits for us must be fixed by the progress of foreign Powers. We cannot take stock of our Navy and measure our requirements except in relation to the strength of foreign Navies. I am, therefore, obliged to refer to foreign countries in making estimates of our naval requirements. Several of the Powers are rapidly developing their naval strength at this moment; but none at a pace comparable with that of Germany. If in what I have to say now I select that Power as the standard by which to measure our own requirements, the House will understand that I do so only for what may be called arithmetical purposes, and without presuming upon the expression of feeling or opinion of my own—except it be one of respectful admiration for administrative and professional efficiency.

STRENGTH IN CAPITAL SHIPS.

In the first place, I take for the purpose of my comparison the newest types of battleships and cruisers only—I will deal afterwards with the earlier types of ships—and I will endeavour to lay before the House the view of the Board of Admiralty with regard to the value of these ships in the computation of relative warlike strength in 1912 and later years. For that is the period which we have to keep in mind when considering our present programme. When the Estimates were presented to Parliament a year ago we had seven battleships of the Dreadnought class and three cruisers of the Invincible class, either afloat or in course of construction. The whole of these were due for completion by the end of 1910. At that time Germany was building four Dreadnoughts and one Invincible, of which two Dreadnoughts were expected to be completed by the end of this year and the remaining three ships in the autumn of 1910. Thus, at that time, we had a superiority in these classes of ships of ten to five in course of construction, with the additional advantage that the whole of ours were expected to be completed some months

in advance of the last three of the German ships. The new German Fleet Bill had at that time become law, and according to our interpretation of its provisions three Dreadnoughts and one Invincible would be laid down in the course of the year 1908-9. The financial provisions of that Bill were such as to lead us to the opinion that no work would be commenced upon these four ships until the month of August last year, and that they would not be completed before February, 1911. This time last year, therefore, we had to contemplate five German ships under construction, three of which would be completed in the autumn of 1910 and four more ships to be commenced about August, 1908, and commissioned in February, 1911. In view of this state of affairs this House of Commons last year approved of a programme of two large ships to be laid down at such a time as would give to this country a total of twelve of these new ships, as against a possible completed German total of nine. In the face of last year's programme no one could with any fairness charge this Government with having started upon a race of competitive armaments. By example as well as by precept we sought to check the rapid rate of shipbuilding. We failed. Whatever we may have to do now it cannot be said that the present Government are setting the pace in construction.

ACCELERATED GERMAN CONSTRUCTION.

Last year we were not in a position to make any possible forecast of the probable construction of foreign countries. The difficulty in which the Government find themselves placed at this moment is that we do not know—as we thought we did—the rate at which German construction is taking place. We know that the Germans have a law which, when all the ships under it have been completed, will give them a Navy more powerful than any at present in existence. We know that, but we do not know the rate at which the provisions of this Act are to be carried into execution. We now expect that the four German ships of the 1908-9 programme will be completed, not in February, 1911, but in the autumn of 1910. I am informed, moreover, that the collection of materials and the manufacture of armaments, guns, and gun-mountings have already begun for four more ships which, according to the Navy Law, belong to the programme of 1909-10. Therefore we have to take stock of the new situation, in which we reckon not nine but thirteen German ships may be completed in 1911, and in 1912 such further ships, if any, as may be begun in the course of the next financial year, or laid down in April, 1910. We may stop here and pay a tribute to the extraordinary growth of the power of constructing ships of the largest size in

Germany. Two years ago, I believe, there were in Germany, with the possible exception of one or two slips in private yards, no slip capable of carrying a Dreadnought. To-day they have actually no less than fourteen such slips and three more under construction. And what is true of the hull of the ships is true also of the guns, armour, and mountings. Two years ago any one familiar with the capacity of Krupp's and other great German firms would have ridiculed the possibility of their undertaking the supply of all the components parts of eight battleships in a single year. To-day this productive power is a realised fact, and it will tax the resources of our own great firms if we are to retain the supremacy in rapidity and volume of construction.

OUR OWN PROGRAMME.

Having said so much on foreign naval development, I turn to our own programme of construction. As I have said, we shall have in March, 1911, eight completed Dreadnoughts and four Invincibles. We propose to lay down two more Dreadnoughts in July of this year, and the terms of the contracts will provide that they shall be completed in July, 1911. We reckon the period of construction of these large ships as two years, but it is impossible to rely upon ships of this type being delivered to time unless considerable notice prior to the laying of the keel is given to the contractors who supply some of the equipments of the ships and unless orders are given for materials. The House will not overlook the fact that the possible output of guns, gun-mountings, and armour is less than the possible output of ship-plates and machinery. The reason is obvious. The one set of materials are materials for war only; the others are used alike in peace and war. To secure completion in July, 1911, orders for the several parts will be given at once if the House approves of these Estimates. Two more ships will be laid down in November this year, to be completed in 1911, and in that year our total strength in Dreadnoughts and Invincibles will be twelve of the former and four of the latter. The date, however, which we have to bear in mind is that up to which the present programme must provide—April, 1912. I have shown that we shall in the course of 1911 have sixteen of these modern ships, as against thirteen ships for which Germany is already making provision. The German law provides for four more ships to be laid down in 1910–11. But if the construction of these ships is accelerated—as I understand was the case of the four ships of the 1909–10 programme—they would be completed by April, 1912. Therefore on that date Germany would have seventeen Dreadnoughts and Invincibles. But even if no

acceleration takes place before April, 1910, this number would be completed in the autumn of 1912. This is a contingency which his Majesty's Government have to take into account.

THE LIFE OF A BATTLESHIP.

We cannot afford to run risks. If we are to be sure of retaining superiority in this by far the most powerful types of battleships, the Board of Admiralty must be in a position, if the necessity arises, to give orders for guns, gun-mountings, armour, and other materials at such a time and to such an amount as will enable them to obtain delivery of four more large armoured ships by March, 1912. We should be prepared to meet the contingency of Germany having seventeen of these ships in the spring of 1912 by our having twenty, but we can only meet that contingency if the Government are empowered by Parliament to give the necessary orders in the course of the present year. I can well imagine that this method of calculating in Dreadnoughts and Invincibles alone may seem unsatisfactory, and even unfair to many persons. They may say:—"What has become of the Lord Nelsons, the King Edwards, the Duncans, and the Formidables, and the earlier battleships on which our naval superiority has been so constantly reckoned? Is no account to be taken of our powerful fleet of armoured cruisers, numbering no less than thirty-five?" Yes; the Board of Admiralty have not forgotten these ships. They still constitute a mighty fleet. The Dreadnought has not rendered them obsolete, and many of them would give a good account of themselves in the line of battle for many years to come. But, though they have not been rendered obsolete by the Dreadnoughts and the Invincibles, yet their life has been shortened. Let me explain what that means. To determine the value of a battleship in relation to the value of ships of a newer and better type is a problem of the same kind as that which confronts the manufacturer whose plant is getting out of date, and who has to determine the precise moment when it would pay him best to scrap his old machinery and to lay down new. Every new improvement, every new invention, every improvement in the method of construction shortens the life of a manufacturer's plant. If he is to compete successfully with his rivals, he must keep his machinery up to date. A battleship must be regarded as a machine of which the output is fighting capacity. All improvements in the designs of ships which increase the fighting capacity necessarily shorten the life of earlier battleships just as in the case of any other machine. The greater the value of the improvements, the sooner the earlier ships become obsolete. Though the upkeep of a Dreadnought costs little if any-

thing more than the upkeep of earlier types of battleship, its fighting capacity is greatly superior, and it follows that the advent of this new improved machine has materially curtailed the profitable life of our previously existing Fleet.

OUR BATTLE STRENGTH IN 1912.

There is, however, a further consideration to be borne in mind. As the years go by the scrapping of older ships is inevitable for another reason. I have seen many forecasts recently of what our Battle Fleet strength would be in 1912. The framers of these forecasts have assumed that we may have sixteen Dreadnoughts and Invincibles in commission in that year, or twelve more than we have at the present moment. To these sixteen they have added the whole of our existing Fleet of battleships, and have produced a startling total, whether reckoned in numbers or in tonnage. Those who, quite naturally and properly, regard this vista of incalculable increase with alarm may be reassured by the reminder that if twelve more Dreadnoughts and Invincibles are put in commission in 1912, twelve other large ships must have passed out of commission. The only condition on which they can all be retained in the Fleet at the same time is that we should greatly increase our *personnel* and our dockyards, at an expense which would be truly staggering, and with a resultant fighting capacity which would not be worth the cost. We have, then, in making our comparison with 1912, to reckon only such ships as will then be on the active list. The House will not expect me to go through our ships in detail, nor could I attempt to give the fighting value of each. Suffice it to say that on the present scale of our Navy, our numerical strength in battleships which could be placed in the fighting line, not including Invincibles, is roughly about fifty, consisting of fully-commissioned and nucleus crew ships, ships in the Special Service list with no more than seventy men on board, and ships in dockyard hands. With this limit to our total numbers it is obviously essential that we should not fall behind in the most powerful type of battleships. There will come a day when by an almost automatic process all ships of an earlier type than the Dreadnought will be relegated to the scrap-heap. The maintenance of our superiority will then depend upon our superiority in Dreadnoughts alone. I have given reasons for believing that the German power of construction of this type of ship is at this time almost, if not fully, equal to our own, owing to their rapid development in the last eighteen months, and we cannot be assured of retaining our superiority at sea if ever we allow ourselves to fall behind in this, the newest and best class of ship.

A CONCOMITANT OF EMPIRE.

I pass now to the consideration of our armoured cruisers other than *Invincibles*. In this type of vessel we have a great superiority alike in numbers and in quality. But what is the purpose of these ships, and to what extent can we concentrate them in Home waters? Clearly we cannot merely count the number of ships in the *Navy List*, add them all together, and reckon their total tonnage without having some regard to the duties which the Navy is called upon to perform. We maintain squadrons in Chinese, Australian, South African, and East Indian waters. There is another cruiser squadron always kept available for service in the Atlantic. If any reduction were proposed in the ships employed on these services representations would immediately be made to the Board of Admiralty by the Foreign Office, the Colonial Office, the India Office, and every great chamber of commerce in the country. The total of these duties, the due performance of which is a concomitant of Empire, absorbs permanently a large number of our cruisers. If, unhappily, we were to be engaged in war, we could not recall all these ships engaged in foreign service back into Home waters. In conceivable circumstances we might even have to increase the numbers on foreign service to ensure the protection of our great trade routes. Even though we retained full command of the sea in Home waters, prolonged or even temporary interference with our foreign trade would greatly distress us. We have, indeed, a great superiority over any foreign Power, both in armoured and protected cruisers, but this is a condition imposed upon us by the obligations of Empire, and our imperative need to keep open the highway of the seas. There is no nation in the world which has anything like the same dependence on foreign trade as we have. Its loss to us would be a vital blow. To any other nation it would merely be an inconvenience. Our commerce, if unprotected in war in remote seas, would be open to foreign armed merchant vessels specially commissioned for the purpose as ships of war. Victory at sea in Home waters would not necessarily protect our foreign trade, nor would it necessarily bring the war to a close. Defeat, on the other hand, in Home waters would certainly end the war, and would be the surest means of protecting the antagonist's foreign trade. I make these observations merely by way of brief explanation of our special need of cruisers, and to show that calculations of battle strength, in which they are all reckoned as available in Home waters, are based on an incomplete appreciation of their true functions.

DETAILS OF THE PROGRAMME.

I pass now to matters which may be regarded as less exciting, and over which I will not detain the House long. First of all let me make mention of the rest of the programme of the year. We propose to lay down six cruisers, of which four will be Bristols and two Bellonas. The four Bristols will be contract ships ordered in November, and to be completed within twenty-one months. The two Bellonas will be laid down at Pembroke Dockyard—one in April of this year and the other in September—and they will also be completed in twenty-one months. These cruisers will be capable of performing the Fleet duties ordinarily carried out by scouts and second and third class cruisers. They will have good accommodation, and such sea-keeping qualities and radius of action as will enable them to be employed, if required, on distant service. It is proposed to lay down a further number of twenty destroyers, the designs of which are now under consideration. Particular attention will be paid to their sea-going qualities. The destroyers will be ordered by contract in November, and will be completed in twenty months. The vote for submarines is further continued, and the sum of £500,000 is proposed to be taken on this account. The works vote for the coming year shows a heavy increase, amounting to £609,600. I have only to remind the House that the two great works Rosyth and Portsmouth Dock are being paid for out of that vote. Another cause of the heavy vote, in which we should have otherwise been able to make some economies, is that we are now completing out of the Estimates certain of the loans works for which full monetary provision was not made in the Naval Works Acts. Under this head alone a sum of no less than £641,700 has to be provided. There is further work undertaken at Loch Long in the shape of a torpedo range, and at Greenock a torpedo factory is to be built in close proximity to the torpedo range at Loch Long.

ROSYTH.

On the subject of Rosyth I think that the House may be interested to hear that in the opinion of the Board of Admiralty the contract has now been most satisfactorily made. The terms of the contract are that the work is to be completed in seven years, but a substantial bonus is given for every week in which the work is completed in advance of seven years. We have strong hopes, in fact, that the contract will be completed in a little over six years. The design of Rosyth is part of a large design which it is not now proposed to carry into execution. I think the House will agree that it is most desirable, when we undertake work of this kind, that of building

a new naval base, that while not committing ourselves to anything beyond actual requirements of the moment, we should anticipate a possible future in which it may be found desirable to extend Rosyth into a naval base of the standard of Portsmouth or Devonport. I think I may be permitted to congratulate the late Board of Admiralty upon the fact that, in making their plans for Rosyth, they took the largest possible view of what could be needed, and out of that whole extracted such part as would be immediately required. It was an integral part of the whole, but is complete in itself. The contract which we have now let is for that smaller but complete part of the whole design, and will give us, when the works are executed, the largest basin which we have in any of our naval ports, a graving dock, and a lock which can be used as a graving dock. Those are the chief works which will be undertaken under this contract. The works in connection with the yard—that is to say, the repairing shops—are not being built under the contract which has now been let, but afterwards a new contract will be made in respect of them and the whole will be completed as required on the termination of the contract which has already been let.

WORKS BUILT OUT OF LOANS.

I had this winter an opportunity of visiting one of our foreign ports on which we have spent a considerable sum of money out of loans. Well, I am bound to say that after three days' careful investigation of the works at Malta I was confirmed in the view that I have now held for some years, that whatever the pressure of the moment may be, it is far better to pay for your works as you go along, and not to pay for them out of loans. The Malta works, I readily admit, are admirable of their kind, and there is no doubt that they have been built with a view to providing for emergencies which might have arisen, but which are regarded as improbable at the present time. But, even with regard to all emergencies, I venture to say that, if the Malta improvements had been placed upon the Estimates and not been built out of loans, as great efficiency would have been produced at considerably less cost. From Malta I passed, by the courtesy of the Resident-General of Tunis and of the Admiral-Superintendent, to an inspection of the newly-built French yard at Bizerta. The yard at Bizerta was built, not out of loans, but out of annual votes. There I found that every effort had been made to produce the best result with the least money, and I am bound to say that the effect upon my mind was that at Bizerta we had got a model of what can be done by forethought, with great regard to economy. I certainly do not think that the lessons which

I learnt at Bizerta will be lost upon those who had the opportunity of seeing that station. I am sure of this, that in our work now at Rosyth, human nature being what it is—whether the human nature be at a Board of Admiralty or anywhere else—the fact that we are bound to go to Parliament year by year for every penny that we spend inevitably entails a more severe regard for economy than would be the case if you simply had to take the money out of a great naval loan.

FLOATING DOCKS.

There is one other subject with regard to docks to which I will refer only for a moment, and that is the question of floating docks. It has been strongly urged in many quarters on the attention of the Board of Admiralty, and I may say that the Board are at this moment giving the most careful consideration to the subject, and inquiring fully into the possibilities of the matter. I am referring now to floating docks of the largest size. The difficulty about floating docks of the largest size is that the very great rise and fall of the tide renders their moorings extremely difficult to make, and consequently there have been two schools of thought with regard to the practicability of making use of this kind of dock. Obviously they are vastly cheaper than the graving dock, and, if a suitable site for them can be obtained and the moorings suitably fastened, there is no doubt that we could save considerably by making much greater use of floating docks than we do at the present time.

THE NEW DISTRIBUTION OF THE FLEET.

One word upon another matter which is referred to in the Statement which I published with the Estimates. I refer to the new distribution of the Fleet. It is proposed that the Home Fleet in Home waters shall consist of four Divisions. The First Division, which will at present contain only two Dreadnoughts and two Lord Nelsons and four other ships, but which will hereafter, as the new Dreadnoughts come into commission, be made up wholly of that class of ship, will have as its base either Rosyth or Portland, as the needs of the moment determine. The Second Division, which will be a homogeneous division, consisting of the eight King Edwards, will, alternately with the other division, have its base at Portland or Rosyth. Each of the Divisions will have its attached cruiser squadron, and also its flotilla of destroyers. For the first time the nucleus crew ships will be placed under separate command, and will form the Third Division of the Home Fleet. The Fourth Division of the Home Fleet will consist of the ships in the Special Service

list—that is to say, ships which only have seventy men on board. The Third and Fourth Divisions will be placed under Vice-Admiral Neville, who will have now a distinct command in these ships; but the whole, of course, will co-operate as one Fleet under the chief command of Admiral May, who will have the separate command as well of the First Division of the Fleet. Not a part of the Home Fleet, but working in co-operation with it, we shall now have the Atlantic Fleet, with its new base at Dover. Hitherto the Atlantic Fleet has had its base at Berehaven and Gibraltar—Gibraltar being used as the repairing station. But the opening of Dover allows us now to bring the Atlantic Fleet closer into Home waters, and its base in future will be alternatively Berehaven or Dover. Thus we have in Home waters twenty-two of the finest ships in the Fleet in full commission; we have eight or nine ships—the numbers may vary to the extent of one or two from time to time according to the emergencies and according to the state of shipbuilding—but we have eight or nine ships, with nucleus crews put in commission, all of which will be ready for war after a few hours' notice. Behind these we have the Fourth Division, stationed at the Home ports, consisting of the Special Service ships. This reorganisation of the fleets has, I think, effected, at one and the same moment, two results. In the first place, we get a greater concentration of strength, and in the second place there is a transfer from fully-commissioned ships to the nucleus crew division of some four battleships.

A DELUSIVE COMPARISON.

There is one other matter to which I must refer. I do so reluctantly, because it entails once again a comparison with the German Navy. But the necessity of dealing frankly with the House when I am proposing Estimates of this character leaves me no alternative. Looking at the huge total, I can well understand any critic saying to me that, whatever reasons I may give for this expenditure, how comes it that the Estimates amount to such a large sum as 35 millions, which is so greatly in excess of the German Estimates for the same period? My answer is, briefly, that in looking merely at totals we are not comparing like with like. Our naval votes have certain charges, such as interest on loans, and sinking fund on loans, pensions, Reserves, half-pay, and retired pay, which in Germany are charged to civil votes. Again, our scale of pay is suited to voluntary service. In Germany, where service is compulsory, naval pay is at a far lower rate. On these items alone—that is to say, on pay and on items charged to civil votes in Germany—the excess which our Estimates have to bear is no less than

£9,000,000. Again, our *personnel* is necessarily more numerous than that of any other Power, apart from the need of superiority in Home waters, by reason of the demand made upon us for foreign service. Our victualling vote is consequently higher—close upon 1½ million in excess of the German. If to these charges be added the necessary cost of the stores of all kinds, other than victualling stores, and the repairs to what I may call our large subsidiary fleet on foreign service, it will be recognised, I think, that there is a full and adequate explanation of the heavy total of our expenditure. I venture to say, indeed, that, having regard to the great range and possibilities of the British Navy and to the fact of its being a voluntary service, no foreign Administration could show a better result in proportion to the money expended. I thank the House for having given me this opportunity of explaining these various matters.

MR. FREDERIC HARRISON ON NATIONAL DEFENCE.*

TO THE EDITOR OF THE *TIMES*.

SIR,—As the paper which I addressed to the Positivist Society, now printed in the March number of their *Review*, has disconcerted some Liberal friends, I ask your leave to explain the grounds for my regarding this problem as vital and urgent.

My views were formed long before recent discussions, and quite apart from any scare of to-day. They have been forced on me by long study of European politics, and are such as I have often expressed, and set forth a year ago in a book on "National and Social Problems."

They are trifling with a serious crisis who repeat platitudes about our friendly neighbours, our peaceable ideals, and our magnificent Navy. Of course, England desires to live at peace with all men, and does not nurse against any Continental nation either jealousy or grudge. And we know that our Navy to-day is amply competent to defend our island and our Empire against any maritime Power in the world. What more can we want? says the old-fashion Radical, intent on retrenchment, and the new-fashion Labour man, intent on social reform.

Well, let us come to the point, and speak plainly on certain facts. The sole ground for serious anxiety as to our national defences arises from what we see as we watch the feverish expansion of the German Navy, combined with the domineering attitude of the German Government in Europe—*plus* the ambitious schemes asserted now for a whole generation by the German military and naval chiefs fomenting the natural aspirations of the great German race.

Absolutely free as I am from any sort of party allegiance, and equally free from any public responsibility, I can speak openly about things which official politicians and judicious publicists have to cover under conventional allusions. Our national existence, I make bold to say, may be in peril, within less than a generation, from the tremendous navy now being hurried on in Germany, from the domineering ambition of the German chiefs, the aspirations and the increase of the German race.

I say the German race, because the Near Eastern crisis can mean nothing less than the eventual amalgamation, or the practical control by one hand, of the entire German-speaking peoples of Central

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Europe. The signal service to Austria rendered by Germany, not without risk to herself, in this Balkan imbroglio must involve that within a few years Europe will be face to face with a hundred millions of Germans trained to war and practically under one military headship. And if to that ever were added the virtual control over the Low-German people of Holland, with her seaports and marine population, a single War Lord ruling from Stettin to the mouths of the Rhine, and from the Baltic to the Adriatic—then Europe will see a power which she has not known since Napoleon and Louis XIV.

There is no doubt about the domineering ambition of German diplomacy, for this is the key that explains the course of history in Europe for the last twenty years. The desperate plunge of Austria into the Balkans was made with the connivance, if not at the suggestion, of Berlin. And, in any case, it is destined to redound to the ultimate advancement of Germany more than of Austria. The aspirations of the German people and the schemes of their chiefs are perfectly natural, given the general situation and the history of the new German Empire. They need cause in us neither surprise nor indignation.

They are facts which all who study the German press, the utterances of their Navy League, the tone of military and civil authorities and the whole Pan-Germanic movement must recognise as real. Radical and Labour politicians do not study this movement. Indeed, one needs to be in close touch with German thought and writing to judge its force. The Pan-Germanic ideal and its aim at hegemony is an obvious result of the European situation and of the history of Germany since the rise of Bismarck in 1864.

Neither I nor my friends have any anti-German prejudice. I have nothing but admiration for the high qualities of the German intellect and character. Since 1851 I have often visited Germany; I have spent months in the country, conversing with Germans and reading their publications. I have good German friends; and two of my sons in their professional careers have been trained in Germany and have made Germany their home. I have known Berlin fifty years ago in its early provincial state, as well as recently in its triumphal state; and I do honour to the grand patriotism and the administrative genius which have given the empire its proud position in the world.

The danger of collision lies, not in any hostile disposition of the German people, but in the manifest tendency of the two dominant facts in world-politics—the military ascendancy and resources of the German Empire face to face with the British Empire based on com-

mand of the sea. When we reflect on the meteoric aggrandisement of Prussia in the last sixty years, on her great military caste, of which Western Europe has no parallel, on the pride and (we may add) the self-consciousness of the German people, coupled with an inborn spirit of patriotism and discipline, we see before us a nation of magnificent endowments and resources, inspired with a faith in its destiny as a dominant world Power. History tells us of more than one such national ambition, and what came of it; and our own history has some record of the issue.

If this were all, as England has not the least desire to dispute the Prussian hegemony in soldiership, much less to discredit it, neither seeks to humiliate nor to weaken the German Empire—if this were all, there need be no antagonism between Germany and Britain. But there is something more than Britain. There is the British Empire. And the British Empire, by the very law of its existence, postulates dominion of the seas, a maritime ascendancy more sweeping than that of Germany on land, and inevitably causing friction by its ubiquitous contact.

For my part, I can feel sympathy with the German patriot, who, proud as he is of his nation's history and might, finds his redundant population shut out from all the most desirable possessions of the planet. And on every sea, and in every port, he is confronted with a maritime Power which not only is paramount there, but claims that it must always remain predominant; that, for its own security, it must be permanently recognised as mistress of the ocean. We are all in the habit of assuming Britain's rule of the waves to be the foundation of international comity, and we forget that other nations do not accept it either as a law of Nature nor as a necessary postulate of the *Jus Gentium*.

France and Russia, to say nothing of smaller States, have no longer the wish or the power to dispute our secular claim, which, so far as the *interests* of other nations go, does them no sort of injury; and, so long as we retain the policy of the "open door," brings them obvious advantages. But nations are not led solely, nor always, by their interests. As we see to-day, they are led not seldom by their pride, their jealousies, or their aspirations. In the Far West a great nation is now aspiring to have there a paramount navy, and in the Far East another nation is aspiring to be mistress at least in her own waters. In Europe, over against our own ports, the great German Empire has striven for twenty years to show the world that, if she cannot be first at sea, as she is on land, she will be a good second to-day, and some day and in certain contingencies might be our equal in North European waters.

Herein are all the elements of a contest quite natural in the ultimate evolution of national destinies, international morality remaining as it is. Not to-day, nor to-morrow—but, with the normal growth of mighty nations, it may well come within the actual generation. It is an antagonism like that between Athens and Sparta, Rome and Carthage, Spain and Britain, Germany and France, one which seems to be independent of persons, even of the will of peoples, to be borne on by the elemental springs of national destinies.

Unless a new war or a reform of international morality should intervene, it seems inevitable that our supremacy at sea will be met by a determined challenge within measurable time—more probably by a combination of Powers, and, no doubt, under the stress of urgent pressure in some part of our scattered possessions. No Power on earth will ever challenge our Navy for years to come—and even then not without an ally, nor unless in the midst of some great crisis which has called our forces to the other side of the globe.

But if within ten or fifteen years such a catastrophe should befall us, and we in this island remain as we are to-day, with the smallest standing Army of any great Power in Europe—who will guarantee our triumph over such a challenge?

For my part, I have never been an expansion Imperialist. I have ever regarded the Empire as an overwhelming responsibility—a *damnosa hereditas*, or perilous inheritance—to be ultimately resolved into self-governing communities, not as being a permanent and coherent nationality, which it never was and never can be. And, if the coming challenge to our maritime supremacy were to threaten simply the diminution or the loss of some overseas dependencies, I for one should not regard this as tantamount to national ruin.

But, if ever our Empire or our dominion of the seas is challenged, we now see that it will be by no desultory attack in distant waters, not on India, South Africa, nor Australasia, but by direct plunge at the heart of the Empire—on our arsenals, our ports, and the capital. The German Navy is not built for distant voyages. It is built to act only as the spear-head of a magnificent army. This army, as we know, has been trained for sudden transmarine descent on a coast; and for this end every road, well, bridge, and smithy in the east of England and Scotland has been docketed in the German War Office.

No! whenever our Empire and maritime ascendancy are challenged, it will be by such an invasion in force as was once designed by Philip and Parma, and again by Napoleon. It is this certainty which compels me to modify the anti-militarist policy which I have consistently maintained for forty years past. The conditions are now changed; new risks involve fresh precautions. The mechanical, as

well as the political, circumstances are quite different from what they were in the days of Wellington, or even of Palmerston and Gladstone. To me now it is no question of loss of prestige—no question of the shrinkage of the Empire; it is our existence as a foremost European Power, and even as a thriving nation.

To talk of friendly relations with Germany and the domestic virtues of the Fatherland is childish. Who in 1860 knew that Prussia was to be the dominant Power in Europe? Who in 1864 imagined that she was to defeat Austria? Who in 1868 foresaw that in two years she would be in Paris? Who in 1888 dreamed that she would be our rival at sea? And what impelled the cultured realm of the Hohenzollerns to break out in "blood and iron" to smash Denmark, to humiliate Austria, to overwhelm France, to defy England on the sea? What was the motive, or the cause? What but the thirst of national glory?

If ever our naval defence were broken through, our Navy overwhelmed or even dispersed for a season, and a military occupation of our arsenals, docks, and capital were effected, the ruin would be such as modern history cannot parallel. It would not be the Empire, but Britain, that would be destroyed. Napoleon's invasions of Italy, Spain, Austria, Germany, or Russia offer no true analogy. Nor does the German occupation of France and the entry into Paris in 1870-71 offer more than a faint parallel. France, Germany, Austria, Russia were vast countries having unexhausted resources even after all defeats. Nor did Napoleon nor Bismarck ever strike home into their enemies' vitals.

The occupation by a foreign invader of our arsenals, docks, cities, and capital would be to the Empire what the bursting of the boilers would be to a Dreadnought. Capital would disappear with the destruction of credit. Famine, social anarchy, incalculable chaos in the industrial and financial world would be the inevitable result. Britain might live on, as Holland lives on. But before she began to live freely again she would have to lose half her population, which she could not feed, and all her overseas Empire, which she could no longer defend.

A catastrophe so appalling cannot be left to chance, even if the probabilities against its occurring were 50 to 1. But the odds are not 50 to 1. No high authority ventures to assert that a successful invasion of our country is absolutely impossible, if it were assisted by extraordinary conditions. And a successful invasion would mean to us the total collapse of our Empire, our trade, and, with trade, the means of feeding 40 millions in these islands. If it is asked, Why does invasion threaten more terrible consequences to us than it does

to our neighbours? the answer is that the British Empire is an anomalous structure, without any real parallel in modern history, except in the history of Portugal, Venice, and Holland, and, in ancient history, Athens and Carthage. Our Empire presents special conditions both for attack and for destruction. And its destruction by an enemy seated on the Thames would have consequences so awful to contemplate that it cannot be left to be safe-guarded by one sole line of defence, however good and, for the present hour, however adequate.

The continuous strain of maintaining a two-Power standard against nations far more populous and increasing more rapidly must in the long run break down. It seems that it has already broken down. Even if we could go on building more ships than Germany and America put together, could we be certain of manning them? And, in any case, whilst the defence of the Empire forces us to keep parts of our Navy in the Mediterranean, in the Indian, Chinese, Atlantic, and Pacific seas, can we rest at ease if a few years hence we were to find our Home Fleet no longer the strongest, even in the seas which wash our own shores?

There is but one issue—the formation of an adequate land defence at home. It would abate the fierce race of armaments and bring the issue to manageable limits. What this land defence should be—whether by an expansion and stiffening of the new Territorial Army, or by compulsory general service—I do not touch. Soldiers of experience tell us that they prefer volunteers, if adequately trained. And few soldiers realise the enormous difficulties of the police organisation conscription involves, and the violence it does to habits of civil life. This is quite apart from actual service, for it implies registration, passports, restriction on movement, and police supervision up to middle age, as in Germany or France.

This is no question to be left to experts of any sort. It is not to be settled for us by soldiers alone, or by seamen alone, or by professors of tactics. It is a mixed and complex problem of politics, history, constitutional law, military and naval experience. Like all our national problems, it has to be settled ultimately by civilian statesmen. It is an urgent problem which concerns all politicians, indeed all citizens, of every class and of any school.

For more than forty years I have raised my voice against every form of aggression, of Imperial expansion, and Continental militarism. Few men have more earnestly protested against postponing social reforms and the well-being of the people to Imperial conquests and Asiatic and African adventures. I do not go back on a word that I have ever uttered thereon. But how hollow is all talk about industrial reorganisation until we have secured our country against a

catastrophe that would involve untold destitution and misery on the people in the mass—which would paralyse industry and raise food to famine prices, whilst closing our factories and our yards! How idle are fine words about Retrenchment, Peace, and Brotherhood, whilst we lie open to the risk of unutterable ruin, to a deadly fight for national existence, and to war in its most destructive and most cruel form!

Yours, &c.,

Hawkhurst.

FREDERIC HARRISON.

TO THE EDITOR OF THE *TIMES*.*

SIR,—May I beg leave to correct some strange misconceptions as to the origin and purport of my letter on this subject which you published on Thursday, the 18th inst.?

My letter was written before any statement by the Government as to naval policy, without any communication with Lord Rosebery, of whose views I am still ignorant, and without reference to any political person, party, or debate.

I emphatically deny that I advocated, or desire any diminution in our Navy or maritime defences. My letter of the 18th was an amplification of the article it cited, written before the meeting of Parliament. Writing early in February, I said, "The safety, the very existence, of this country depends at present on a Navy of overwhelming proportions." I added that I should "not quarrel with any naval programme that a responsible Government judges to be of absolute necessity." So much for the fiction, or untruth, that I am advocating a little Navy, or even a reduced Navy, or have taken any part in recent and pending debates as to Dreadnoughts.

It is equally untrue that I have changed my opinion as to Continental "militarism," as to Imperialism, and a policy of peace. An imminent danger, which I have long seen to be preparing abroad, forces upon me the necessity of a defensive system which a few years ago would have been needless and mischievous.

For many years I have been urging that our vast and growing Empire was involving us in tremendous responsibilities and risks, and that our maritime supremacy was soon to be challenged by Germany. I said nothing in my last letter which had not been in substance contained in my volume on "National Problems," published a year ago. The same danger led Professor Beesly, in January last, to write that, unless we would consent to withdraw our Army from India, we must expect a system of enforced service. And

* Published March 24th, 1909.

Mr. Hyndman and his party, extreme Socialists and comrades of German Democrats as they are, say the same thing.

I have, of course, fully considered the opinion of the extreme Blue-water school, that any land defence is useless, because an enemy, once in command of the sea, would starve us into surrender in a few weeks without landing a man. That is gross exaggeration. The enormous coast-line of these islands makes any strict and continuous blockade impossible by all the navies of the world. And the incredible profits open to the blockade runners of neutrals in such a case confirm the impossibility. Those who have studied the history of naval strategy, and the conditions of blockade—and I have had to do this as Professor of International Law and for my histories of Chatham, of Cromwell, and of William the Silent—well know that to talk of a navy of Dreadnoughts, however big, but with no equal strength of cruisers, effectively closing the whole of these islands against the introduction of food is utterly fantastic. More than that, to talk of surrender thereon is unworthy of Englishmen.

No, Sir, the temporary disablement or dispersion of our Fleet would be, no doubt, a ghastly disaster. It is not an impossibility. But to take it lying down, and to tell us that, if it does come, we have nothing left but to welcome the conqueror in London, and hand over to him Portsmouth, Plymouth, the Mersey, and the Tyne—this is a mere counsel of despair.

My own view is perfectly plain. As things stand, a predominant Fleet is a matter of national existence. I receive daily fresh information as to the imminence of our peril. It is a peril which I have long foreseen and urged my countrymen to provide means to resist. I have changed no opinion as to the evils of warlike institutions and dreams. But the new form of our national peril does compel me to see that a second defence—a territorial army of some kind—is now absolutely essential to our peace and our honour as a living nation. If our people were prepared to withdraw our armies from overseas, as the Roman Empire did when the Goths pressed in on it, we should be perfectly safe with our Regular Army at home. Short of that solution, we need not only a powerful Navy, but a well-trained Army here as a second line. I listen carefully to what the experts tell us, but I do not pretend to discuss its form.

Whatever I have said is independent of parties, debates, or programmes. I write only as an Englishman who for years has been trying to warn the public of a peril which most cool observers now admit to be no idle scare.

Yours, &c.,

FREDERIC HARRISON.

**RESULT OF TEST OF GUNLAYERS WITH HEAVY GUNS IN HIS MAJESTY'S
FLEET, 1908.**

	1899.	1900.	1901.	1902.	1903.	1904.	1905.	1906.	1907.	1908.
Number of ships that fired . . .	136	121	127	139	134	103	100	89	121	117
Number of guns	1,121	1,031	1,137	1,241	1,296	1,171	1,036	1,073	1,365	1,277
Number of hits {1906 target	2,831	2,732	3,562	4,789	5,996	5,748	4,374	5,733	7,547	..
{1907 " . . . . .	..	..	..	..	..	..	..	..	4,073	4,826
Number of misses {1906 "	6,249	5,709	6,244	6,863	7,023	7,664	3,357	2,323	1,991	..
{1907 " . . . . .	..	..	..	..	..	..	..	..	5,465	4,183
Excess of hits over misses {1906 "	Nil	Nil	Nil	Nil	Nil	Nil	1,017	3,405	5,556	..
{1907 " . . . . .	..	..	..	..	..	..	..	..	Nil	643
Excess of misses {1906 "	3,418	2,977	2,632	2,074	1,032	1,916	Nil	Nil	Nil	..
{1907 " . . . . .	..	..	..	..	..	..	..	..	1,392	Nil
Percentage of hits {1906 "	31.1	32.3	36.3	41.1	46.04	42.86	56.58	71.12	79.13	..
{to rounds fired {1907 " . . . . .	..	..	..	..	..	..	..	..	42.70	53.57
Hits per gun per minute—										
12" and 10" {1906 target	.29	.30	.33	.33	.53	.47	.53	.81	.61	..
{1907 " . . . . .	..	..	..	..	..	..	..	..	.40	.56
9.2" . . . {1906 " . . . . .	.23	.22	.31	.35	.70	.73	1.40	2.84	3.25	..
{1907 " . . . . .	..	..	..	..	..	..	..	..	2.01	2.20
7.5" . . . {1906 " . . . . .	..	..	..	..	..	..	..	..	3.48	..
{1907 " . . . . .	..	..	..	..	..	..	..	..	1.58	2.51
6" Q.F. and {1906 "	1.05	1.51	1.81	2.41	2.63	2.63	4.14	5.63	5.93	..
{1907 " . . . . .	..	..	..	..	..	..	..	..	3.32	3.98
B.L. . . . {1906 "	1.82	1.60	1.93	2.02	2.47	2.23	3.73	4.96	5.73	..
4.7" and 4" {1907 " . . . . .	..	..	..	..	..	..	..	..	2.38	3.32
Q.F. . . . {1906 " . . . . .	..	..	..	..	..	..	..	..	..	..
Number of ships from whom no returns were received. }	32	29	47	19	30	43	Nil	Nil	3	8

ABSTRACT, 1908.

Order of Merit.	Fleet or Squadron.	No. of Ships.	No. of Men Firing.	Points per Man.	First Ship in Fleet.	Scores.
1	CHINA	6	74	63.617	King Alfred . .	71.18
2	{Channel and First Cruiser}	20	234	50.981	Good Hope . .	81.33
3	CAPE OF GOOD HOPE	3	29	48.909	Hermes	61.40
4	Home and Fifth Cruiser	38	394	48.124	Argonaut . . .	79.14
5	{Atlantic and Second Cruiser}	11	142	41.740	Exmouth . . .	65.77
6	{Mediterranean and Third Cruiser}	14	172	40.998	Canopus . . .	55.53
7	{Special Service, Tenders, &c.}	13	68	38.932	Cadmus	73.22
8	East Indies	3	27	33.466	Proserpine . .	39.23
9	Australia	8	79	33.080	Cambrian . . .	42.79
10	{N. A. and W. I. and Fourth Cruiser}	1	8	26.055	Brilliant . . .	26.06
	Total, 1908 Test	117	1,277	45.775		
	Total, 1907 Test	121	1,365	36.884		
	Difference	-4	-88	+8.891		

RESULTS OF TEST OF GUNLAYERS WITH HEAVY GUNS OF ALL SHIPS IN HIS MAJESTY'S FLEET, 1908; CLASSIFIED IN
ORDER OF MERIT OF SHIPS COMPETING.

Order of Merit.	Ship.	Whether 1st or 2nd Firing.	Points.	No. of Men Firing.	Guns.	Rounds.	Hits.	Per Minute.		Points per Man.	Best Shot in Ship.	Hits made by Beat Shot.	Comparison with 1907 Results.	
								Rounds.	Hits.				Bulls, 1907.	Hits, 1908.
1	Good Hope . . .	2nd	81.33	{ 2	9.2" Mark X. . .	18	14	4.50	3.50	79.08	C. Todd, C.P.O. . .	8	15	14
2	Argonaut . . .	1st	79.14	16	6" B.L. VII. . .	140	106	8.75	6.63	81.62	E. Brown, Gnr., R.M.A. . .	10	73	106
3	Cadmus . . .	2nd	73.22	6	4" Q.F. . .	47	28	8.56	6.56	79.14	G. Sparshott, C.P.O. . .	11	..	105
4	King Edward VII.	2nd	72.78	{ 2	12" Mark IX. . .	35	27	10.44	6.22	73.22	E. Woods, P.O. (2). . .	7	13	28
5	King Alfred . . .	1st	71.18	{ 4	9.2" Mark X. . .	19	10	3.45	1.82	50.00	T. May, P.O. (2). . .	5	9	10
6	Hibernia . . .	2nd	70.58	{ 2	6" B.L. VII. (a) . .	88	61	4.38	3.38	76.21	T. Lee, A.B. . .	8	10	27
7	Dreadnought . . .	2nd	70.00	{ 10	9.2" Mark X. . .	17	12	8.80	6.10	75.15	F. Wootton, Gr., R.M.A. . .	10	31	61
8	Warrior . . .	2nd	67.30	{ 16	6" B.L. VII. (b) . .	134	98	4.25	3.00	67.74	A. James, C.P.O. . .	7	..	12
9	Bedford . . .	2nd	66.73	{ 2	12" Mark IX. . .	19	14	8.38	5.81	71.61	E. Jago, C.P.O. . .	10	1	93
10	Doris . . .	2nd	66.03	{ 4	9.2" Mark X. . .	31	23	8.45	2.55	70.00	C. Webber, Act. C.P.O. . .	8	8	14
11	Exmouth . . .	2nd	65.77	{ 10	6" B.L. XI. . .	77	54	3.88	2.88	64.92	W. Mayne, P.O. (1). . .	8	8	23
12	Kent . . .	1st	64.68	{ 5	12" Mark X. . .	53	35	7.70	5.40	72.95	R. Glendenning, Gnr., R.M.A. . .	9	35	54
				{ 6	9.2" Mark X. . .	53	36	3.85	2.55	70.00	J. Goddard, C.P.O. . .	6	18	35
				{ 4	7.5" B.L. . .	40	28	4.42	3.00	67.74	J. Turner, P.O. (2). . .	9	30	26
				{ 12	6" B.L. (b) . .	91	65	5.71	4.00	66.64	H. Croton, L.S. . .	10	17	28
				{ 11	6" B.L. (b) . .	76	59	6.58	5.42	66.73	E. Hawkins, P.O. (1). . .	8	60	65
				{ 2	12" Mark IX. . .	19	12	6.91	5.86	66.03	H. Page, P.O. (2). . .	7	19	59
				{ 12	6" B.L. VII. (b) . .	97	65	3.45	2.18	60.00	H. Lang, P.O. (1). . .	6	8	13
				{ 13	6" B.L. VII. (b) . .	101	63	8.08	5.42	66.73	J. Blackman, P.O. (1). . .	10	52	65
				{ 12	6" B.L. VII. (b) . .	101	63	8.42	5.25	64.68	P. McGinness, A.B. . .	..	..	63

13	Commonwealth	2nd	63-74	2 4	12" Mark IX. 9-2" Mark X. 6" B.L. VII. (a)	17 28 87	10 16 60	3-09 3-50 8-70	1-82 2-00 6-00	50-00 45-16 73-92	W. Hicks P.O. (1) P. Harrington P.O. (1) S. Caswell, Bom. R.M.A.	6 7 9	3 14 21	10 16 60
14	Prince George	2nd	68-28	2 12	12" Mark VIII. 6" Q.F.	17 97	9 66	3-09 8-08	1-64 5-50	45-00 66-38	J. Wood, P.O. (1) A. Russell, A.B.	6 9	6 51	9 66
15	Cochrane	2nd	63-14	6 4	9-2" Mark X. 7-5" B.L.	50 45	34 26	4-17 6-43	3-71 8-71	63-98 61-88	W. Dyer, Corp., R.M.A. G. Allen, P.O. (2)	9 9	25 34	9 26
16	Hermes	3rd	61-40	11 4	6" Q.F. 7-5" B.L.	90 45	56 34	8-18 7-67	5-09 4-83	61-40 59-55	A. Watkins, L.S. O. Wiles, P.O. (1)	8 7	37 11	56 58
17	Essex	2nd	59-55	12 11	6" B.L. VII. (b) 6" B.L. VII. (b)	92 83	58 53	7-67 7-55	4-83 4-82	59-55 59-36	S. King, Lance-Sergt., R.M.L.I.	8 7	11 20	53 58
18	Talbot	2nd	59-36	11 2	6" B.L. VII. (b) 6" Q.F.	83 14	53 6	7-55 7-00	4-82 3-00	59-36 36-18	S. King, Lance-Sergt., R.M.L.I. H. Hollow, Corp., R.M.L.I.	7 3	20 11	58 6
19	Astrea	2nd	59-08	8 6	4-7" Q.F. 9-2" Mark X.	76 51	45 35	9-50 4-25	5-63 2-92	64-80 65-86	J. Waltham, L.S. G. Clapson, Bom. R.M.A.	10 9	36 48	45 35
20	Achilles	2nd	58-56	4 7	7-5" B.L. 12" Mark VIII.	33 18	20 62	4-71 3-27	2-86 1-09	47-60 30-00	R. Glass, L.S. J. Orgee, P.O. (1)	7 3	19 4	20 6
21	Magnificent	2nd	57-69	2 12	12" Mark VIII. 6" Q.F.	18 83	20 62	3-27 6-92	1-09 5-17	30-00 62-36	T. Withames, P.O. (1) W. Daniels, P.O. (1)	8 7	4 2	6 11
22	Hermione	2nd	57-04	2 8	6" Q.F. 4-7" Q.F.	16 69	11 38	8-00 7-09	5-50 4-91	66-38 56-56	W. Daniels, P.O. (1) J. Green, P.O. (1)	6 5	10 5	38 9
23	Circe	2nd	56-56	2 4	4-7" Q.F. 6" B.L. VII. (b)	13 86	9 55	7-09 7-17	4-91 4-58	56-56 56-47	W. Flower, A.B. W. Pike, P.O. (2)	5 8	5 8	9 55
24	Monmouth	1st	56-47	12 2	6" B.L. VII. (b) 12" Mark IX.	20 36	9 27	7-17 3-64	4-58 1-64	56-47 45-00	H. Challen, P.O. (1) A. Church, P.O. (2)	6 8	7 16	9 27
25	Africa	2nd	55-92	4 10	9-2" Mark X. 6" B.L. XI.	36 67	27 37	4-50 6-70	3-38 3-70	76-21 49-99	E. Stone, Sgt., R.M.A. S. Marsh, P.O. (1)	8 3	16 41	27 37
26	Canopus	1st	55-53	2 12	12" Mark VIII. 6" Q.F.	15 90	15 57	2-73 7-50	1-64 4-75	45-00 57-29	S. Marsh, P.O. (1) J. Corle, A.B.	7 3	57 5	9 26
27	Black Prince	1st	55-50	6 10	9-2" Mark X. 6" B.L. XI.	39 71	26 44	3-25 7-10	2-17 4-40	48-92 59-44	G. Fisher, A.B. J. Ward, P.O. (2)	7 6	57 30	26 44
28	Berwick	2nd	55-44	12 4	6" B.L. VII. (b) 4" Q.F.	87 13	54 7	7-25 8-67	4-50 4-67	55-44 54-92	T. Twobig, L.S. S. Strange, P.O. (2)	9 4	54 5	7 5
29	Britomart	2nd	54-92	2 12	4" Q.F. 12" Mark IX.	13 13	5 58	8-67 7-36	4-67 0-91	54-92 25-00	S. Strange, P.O. (2) J. Bartholomew, P.O. (1)	5 4	5 3	7 5
30	Irresistible	2nd	54-61	2 12	12" Mark IX. 6" B.L. VII. (a)	13 90	5 58	7-36 7-50	0-91 4-83	25-00 59-55	A. Ferguson, Gunr., R.M.A.	7 4	56 5	58 5
31	Glory	1st	53-53	2 12	12" Mark VIII. 6" Q.F.	11 88	5 58	2-00 7-33	0-91 4-83	25-00 58-29	P. Pearce, P.O. (1) R. Russell, L.S.	4 8	5 58	5 58

(b) = ½ charges.

(a) = full or ¾ charges.

RESULTS OF TEST OF GUNLAYERS WITH HEAVY GUNS—continued.

Order of Merit.	Ship.	Whether 1st or 2nd Firing.	Points.	No. of Men Firing.	Guns.	Rounds.	Hits.	Per Minute.		Points per Man.	Best Shot in Ship.	Hits made by Best Shot.	Comparison with 1907 Results.	
								Rounds.	Hits.				Bulls, 1907.	Hits, 1908.
32	Britannia . . .	2nd	52.43	{ 2 4 10 }	12" Mark IX. 9.2" Mark X. 6" B.L. XI.	14 25 67	3 19 44	2.55 3.13 6.70	0.55 2.98 4.40	15.00 53.63 59.44	G. Fisher, C.P.O. H. Wilkes, A.B. J. Long, A.B.	2 7 8	6 14 42	3 19 44
33	Hampshire . .	2nd	51.91	{ 4 6 }	7.5" B.L. 6" B.L. VII. (a)	34 42	17 29	4.86 7.00	2.43 4.83	40.46 59.55	A. Evans, P.O. (1) B. Brice, Lance-Sgt., R.M.L.I.	6 7	12 20	19 29
34	Speedwell . . .	2nd	51.84	{ 2 }	4.7" Q.F.	15	9	7.50	4.50	51.84	E. Foster, C.P.O.	6	4	9
35	Bulwark . . .	2nd	51.81	{ 2 13 }	12" Mark IX. 6" B.L. VII. (b)	15 89	6 54	2.73 7.42	1.09 4.50	30.00 55.44	A. Dark, P.O. (1) E. Baker, P.O. (1)	5 6	3 31	6 54
36	Majestic . . .	2nd	51.67	{ 2 12 }	12" Mark VIII. 6" Q.F.	15 80	6 55	2.73 6.67	1.09 4.58	30.00 55.28	W. Harper, P.O. (2) A. Down, Sergeant, R.M.L.I.	4 7	1 23	6 52
37	Duncan . . .	1st	51.47	{ 2 12 }	12" Mark IX. 6" B.L. VII. (b)	13 84	8 52	2.86 7.00	1.45 4.33	40.00 53.39	A. Dark, P.O. (1) F. Seymour.	3 7	..	8 52
38	Goliath . . .	1st	51.39	{ 2 12 }	12" Mark VIII. 6" Q.F.	14 78	2 58	2.55 6.50	0.36 4.83	10.00 58.23	P. James, A.B. J. Williamson, Pte., R.M.L.I.	2 7	..	..
39	Donegal . . .	1st	51.37	{ 12 }	6" B.L. VII. (b)	86	50	7.17	4.17	51.37	W. Jenkins, P.O. (2)	8	..	50
40	Natal . . .	1st	51.18	{ 6 4 }	9.2" Mark X. 7.5" B.L.	53 41	31 17	4.42 5.86	2.88 2.43	58.83 40.46	G. Boyes, Sgt., R.M.A. G. Eaton, P.O. (1)	9 7	..	31 17
41	Topaze . . .	2nd	50.99	{ 12 }	4" Q.F.	89	39	9.99	4.33	50.99	F. Hudson, A.B.	5	23	39
42	Amethyst . . .	1st	50.99	{ 12 }	4" Q.F.	77	39	8.56	4.33	50.99	E. Rideout, A.B.	6	..	39
43	Queen . . .	2nd	50.54	{ 2 12 }	12" Mark IX. 6" B.L. VII. (b)	13 87	3 55	2.86 7.25	0.55 4.58	15.00 56.47	N. Hocken, P.O. (2) J. Blanchard, Gunr., R.M.A.	3 7	3 98	3 55
44	Albion . . .	2nd	50.38	{ 2 12 }	12" Mark VIII. 6" Q.F.	12 92	3 56	2.18 7.67	0.55 4.67	15.00 56.28	E. St. John, P.O. (1) G. Frost, Act-Bomb., R.M.A.	3 8	5 64	3 56

45	Russell	1st	49-33	{ 2	12" Mark IX.	14	5	2-55	0-91	25-00	H. Brady, P.O. (1)	2	..	5
46	Forte (Apl.)	1st	48-82	{ 2	6" B.L. VII. (b)	88	52	7-33	4-33	53-39	J. Slade, Gnr., R.M.A.	9	..	52
47	New Zealand	2nd	47-70	{ 8	6" Q.F.	15	8	7-50	4-00	48-24	A. Edge, Sgt., R.M.L.I.	5	..	8
48	Charybdis	2nd	47-45	{ 2	4-7" Q.F.	70	34	8-75	4-25	48-96	A. Kenny Pte, R.M.L.I.	7	..	34
49	Cumberland	1st	47-23	{ 8	12" Mark IX.	18	10	3-27	1-82	50-00	W. Bolt, P.O. (1)	7	6	10
50	Bramble	1st	47-07	{ 2	9-2" Mark X.	24	14	3-00	1-75	39-52	S. Kennell, A.B.	6	9	14
51	Leviathan	1st	45-48	{ 10	6" B.L. VII. (a)	73	41	7-30	4-10	50-51	W. Wilson, Corp., R.M.A.	7	30	41
52	Formidable	2nd	44-93	{ 2	6" Q.F.	11	4	5-50	2-00	24-12	J. Tomsett, Pte., R.M.L.I.	2	5	4
53	Venerable	1st	44-71	{ 8	4-7" Q.F.	66	37	8-25	4-63	53-28	W. Dring, L.S.	7	15	37
54	Minotaur	1st	44-48	{ 12	6" B.L. VII. (b)	89	46	7-42	3-88	47-23	J. Biggs, Pte., R.M.L.I.	7	..	46
55	Diana	2nd	43-68	{ 2	4" Q.F.	16	6	10-65	4-00	47-07	G. Blackmore, A.B.	5	..	6
56	Aboukir	2nd	43-49	{ 16	9-2" Mark X.	106	61	2-75	1-50	33-87	W. Rutter, L.S.	7	..	6
57	Vengeance	1st	43-20	{ 2	6" B.L. VII. (b)	16	5	2-63	3-81	46-33	J. Clatworthy, P.O. (2)	7	11	5
58	Algerine	1st	43-15	{ 12	12" Mark IX.	94	47	7-83	0-91	25-00	T. Purkis, P.O. (1)	7	54	47
59	Cambrian	1st	42-79	{ 2	6" B.L. VII. (b)	17	1	3-09	0-13	5-00	J. Davis, Corp., R.M.A.	1	..	1
60	Dido	2nd	42-56	{ 2	9-2" Mark X.	89	50	7-42	4-17	51-33	G. Buckett, L.S.	7	..	50
61	Vindictive	1st	42-21	{ 10	6" B.L. VII. (b)	19	10	4-75	2-50	52-65	J. Swain, Sgt., R.M.L.I.	3	..	10
62	Encounter	1st	41-44	{ 12	7-5" B.L.	82	45	4-69	2-57	42-84	T. Toye, P.O. (1)	8	..	45
63	Devonshire	1st	41-38	{ 2	6" B.L. VII. (b)	82	39	7-45	3-54	43-68	T. Cathie, Sgt., R.M.A.	7	33	39
64	Jupiter	1st	41-04	{ 12	6" Q.F.	14	7	3-50	1-75	39-52	J. Quick, L.S.	4	5	7
				{ 2	6" B.L. VII. (b)	74	43	6-17	3-58	44-15	C. Thacker, P.O. (1)	6	90	43
				{ 2	6" Q.F.	14	5	2-55	0-91	25-00	F. Davies, A.B.	3	..	5
				{ 4	4" Q.F.	87	46	7-25	3-88	46-23	W. Drew, L.S.	7	..	46
				{ 2	6" Q.F.	26	11	8-67	3-67	43-16	C. Howard, A.B.	3	..	11
				{ 8	4-7" Q.F.	11	3	5-50	1-50	18-09	P. Thomas, P.O. (1)	3	..	3
				{ 2	6" B.L. VII. (b)	58	34	7-25	4-25	48-96	P. Cahill, P.O. (1)	2	..	34
				{ 11	6" Q.F.	70	98	6-36	3-45	42-56	B. Trebilcock, L.S.	8	..	38
				{ 10	6" B.L. VII. (b)	54	35	5-40	3-50	42-21	J. Hickman, P.O. (2)	6	24	35
				{ 11	6" Q.F.	74	37	6-73	3-36	41-44	W. Shipley, P.O. (2)	7	..	37
				{ 4	7-5" B.L.	31	15	4-48	2-14	35-70	F. Barber, Pte., R.M.L.I.	5	..	15
				{ 6	6" B.L. VII. (a)	36	22	6-00	3-67	45-17	C. Yeo, P.O. (1)	5	..	22
				{ 2	12" VIII.	13	8	2-36	1-45	40-00	C. Bulbeck, P.O. (1)	3	..	8
				{ 12	6" Q.F.	78	41	6-50	3-42	41-21	W. Koppers, C.P.O.	8	..	41
											W. Mountain, A.B.			

(b) = † charges.

(a) = full or † charges.

RESULTS OF TEST OF GUNLAYERS WITH HEAVY GUNS—continued.

Order of Merit.	Ship.	Whether 1st or 2nd Firing.	No. of Men Firing.	Guns.	Rounds.	Hits.	Per Minute.		Points per Man.	Best Shot in Ship.	Hits made by Best Shot.	Comparison with 1907 Results.	
							Rounds.	Hits.				Hits, 1907.	Hits, 1908.
65	Argyll . . .	1st	4	7-5" B.L. . .	33	8	4-71	1-14	19-04	B. Flynn, P.O. (1) . .	4	..	8
66	Illustrious . . .	1st	6	6" B.L. VII. (a) . .	43	27	7-17	4-50	55-44	W. Stevens, P.O. (1) . .	7	..	27
			2	12" Mark VIII. . .	11	5	2-00	0-91	25-00	A. Shute, P.O. (1) . .	2	..	5
67	Carnarvon . . .	1st	12	6" Q.F. . .	66	43	5-50	3-58	43-22	D. Hayes, P.O. (1) . .	5	..	43
			4	7-5" B.L. . .	27	15	3-86	2-14	35-70	W. Wheeler, L.S. . .	6	..	15
			6	6" B.L. VII. (a) . .	37	21	6-17	3-50	43-12	C. Kershaw, Pto., R.M.L.I. . .	5	..	21
68	Lancaster . . .	1st	12	6" B.L. VII. (b) . .	65	39	5-42	3-25	40-04	J. Slack, Pto., R.M.L.I. . .	6	..	39
69	Shannon . . .	1st	2	9-2" Mark XL . .	16	4	4-00	1-00	21-06	F. Myall, P.O. (1) . .	2	..	4
70	Blenheim * . . .	1st	10	7-5" B.L. . .	87	46	4-97	2-63	43-79	C. Alliston, P.O. (1) . .	8	..	46
			4	6" Q.F. . .	20	12	5-45	3-27	39-48	B. Allen, C.P.O. . .	5	..	12
71	Ocean . . .	1st	2	12" Mark VIII. . .	15	2	2-73	0-86	10-00	W. Perring, C.P.O. . .	1	..	2
			12	6" Q.F. . .	76	44	6-33	3-67	44-22	J. Hurdon, P.O. (1) . .	7	..	44
72	Prosperino . . .	2nd	8	4" Q.F. . .	49	20	8-17	3-33	39-23	F. T. Ford, A.B. . .	8	9	20
			6	4" Q.F. . .	45	15	10-00	3-33	39-23	F. Wyatt, A.B. . .	5	13	15
75	Thistle . . .	1st	2	4" Q.F. . .	12	5	8-00	3-33	39-23	F. Yeo, A.B. . .	5	..	5
			11	6" B.L. VII. (b) . .	76	35	6-91	3-18	32-20	D. Mitchell, Corp., R.M.L.I. . .	5	27	35
76	Pegasus . . .	2nd	8	4" Q.F. . .	51	19	8-50	3-17	37-26	A. Welling, P.O. (1) . .	5	4	19
78	Sapphire . . .	2nd	8	4" Q.F. . .	49	19	8-17	3-17	37-26	J. McIlroy, L.S. . .	5	..	19
			12	4" Q.F. . .	65	28	7-23	3-11	36-61	E. Witherden, A.B. . .	5	25	28
79	Hindustan . . .	2nd	2	12" Mark IX. . .	8	0	1-45	0-00	0-00	W. Grover, P.O. (2) . .	0	6	0
			4	9-2" Mark X. . .	22	12	2-75	1-50	33-87	F. Goss, Gnr., R.M.A. . .	6	3	12
80	Albemarle . . .	1st	10	6" B.L. VII. (a) . .	73	35	7-30	3-50	43-12	F. Marston, P.O. (1) . .	7	24	35
			2	12" Mark IX. . .	13	5	2-36	0-91	25-00	W. Vinnicombe, P.O. (1) . .	4	..	5
			12	6" B.L. VII. (b) . .	84	86	7-00	3-00	36-96		4	..	86

81	Drake	2nd	35-19	{ 2 16 11	9-2" Mark X. 6" B.L. VII. (b) 6" Q.F.	14 94 66	7 45 32	3-50 5-88 6-00	1-75 2-81 2-91	39-52 34-65 35-08	G. Lofting, P.O. (1) . W. Dean, P.O. (1) . W. Harmer, Pte., R.M.L.L.	5 8 7	6 59 24	7 45 32
83	Juno	2nd	34-72	11	6" B.L. VII. (b)	80	31	7-27	2-82	34-72	W. Walter, L.S. . .	5	39	31
84	Roxburgh	2nd	33-99	{ 4 6 10	7-5" B.L. 6" B.L. VII. (a) 9-2" Mark X. . .	29 39 35	15 16 18	4-14 6-50 2-92	2-14 2-67 1-50	35-70 32-85 33-87	R. Foot, P.O. (1) . E. Pring, P.O. (2) . C. Mortimer, C.P.O. .	5 5 6	15 26 16	15 16
85	Duke of Edinburgh	1st	33-81	{ 6 10 12	6" B.L. XI. 12" Mark IX. 6" B.L. VII. (b)	67 20 85	25 5 84	6-70 3-64 7-08	2-50 0-91 2-83	33-78 25-00 34-91	S. Miles, A.B. . . . W. Kent, P.O. (1) . C. Weller, P.O. (2) .	5 3 6	23 7 66	13 5 34
86	Prince of Wales	2nd	33-49	{ 2 12 4	6" B.L. VII. (b) 6" Q.F.	85 20	10	5-45	2-73	32-90	H. Mann, P.O. (1) .	5	5	10
87	Blake*	1st	32-90	12	4" Q.F.	63	25	7-00	2-78	32-69	C. Hockey, P.O. (1) .	5	22	10
88	Diamond	2nd	32-69	{ 2 12 16	6" B.L. VII. (b) 6" B.L. VII. (b) 9-2" Mark VIII. 6" Q.F.	6 56 105	1 31 43	1-09 4-67 6-56	0-18 2-58 2-69	5-00 36-96 32-41	W. Brooks, C.P.O. . W. Day, P.O. (1) . T. Hallam, Pte., R.M.L.L.	1 6 6	22 ..	31
89	Cornwallis	1st	32-39	{ 2 12 16	12" Mark IX. 6" B.L. VII. (b) 6" Q.F.	79 56 15	36 31 7	6-58 4-67 2-73	3-00 2-58 1-27	36-96 31-83 35-00	E. Jeffkins, P.O. (1) . O. Smith, P.O. (2) . A. King, P.O. (2) .	6 3 3	..	7
90	Suffolk	1st	31-88	12	9-2" Mark X. . .	11	5	2-25	1-38	31-05	J. Strevens, P.O. (2) .	4	..	11
91	Powerful	1st	31-59	{ 2 16 10	6" B.L. VII. (b) 6" B.L. VII. (b) 9-2" Mark X. . .	8 47 11	2 16 5	2-00 6-56 7-83	0-50 2-69 2-67	25-00 32-41 31-38	W. Alcock, Sgt., R.M.A. E. Pilkington, A.B. . A. Stewart, P.O. (1) .	6 3 4	..	23
92	Dominion	1st	31-39	{ 2 16 10	6" B.L. VII. (b) 6" B.L. VII. (b) 9-2" Mark X. . .	8 47 11	2 16 5	2-75	1-25	28-23	G. Beattyman, Col., Sergt., R.M.A.	6	..	5
93	Prometheus	2nd	31-38	{ 2 16 10	6" B.L. VII. (b) 6" B.L. VII. (b) 9-2" Mark X. . .	8 47 11	2 16 5	6-25	2-58	31-83	F. Miller, P.O. (1) . D. Flavin, A.B. . .	4	..	4
94	Bacchante	1st	31-31	{ 2 16 10	6" B.L. VII. (b) 6" B.L. VII. (b) 9-2" Mark X. . .	8 47 11	2 16 5	7-00	2-00	24-12	J. Webster, P.O. (1) . A. Scoble, P.O. (1) . F. Lynch, P.O. (1) .	5 1 4	..	23
95	Flora	1st	30-17	{ 2 8 12	6" Q.F. 4-7" Q.F. 12" Mark VIII. .	14 58 12	4 22 1	2-25	2-75	31-68	T. Boswell, A.B. . .	4	..	4
96	Hannibal	1st	29-14	{ 2 12 16	6" Q.F. 4-7" Q.F. 12" Mark VIII. .	14 58 12	4 22 1	2-18	0-18	5-00	A. Watton, Corp., R.M.L.L.	5	..	23
97	Shinnick	1st	28-80	2	6" Q.F.	69	33	5-75	2-75	33-17	G. Heath, L.S. . . .	5	..	33
98	Minerva	2nd	28-00	11	6" B.L. VII. (b)	77	25	7-00	2-50	28-80	R. Kelly, P.O. (1) .	4	..	33
99	Philomel	1st	27-36	8	4-7" Q.F.	63	19	7-00	2-37	28-00		5	36	23
100	Barham	2nd	26-88	6	4-7" Q.F.	53	14	7-88	2-38	27-36		4	14	14
101	Cæsar	1st	26-70	{ 2 12	12" Mark VIII. 6" Q.F.	10 70	0 31	1-82	0-00	0-00		5	..	0
								5-83	2-58	31-16			..	31

(b) = 1 charges.

(a) = full or 3 charges.

• Fired 55 seconds.

RESULTS OF TEST OF GUNLAYERS WITH HEAVY GUNS—*continued*.

Order of Merit.	Ship.	Whether 1st or 2nd Firing.	Points.	No. of Men Firing.	Guns.	Rounds.	Hits.	Per Minute.	Points per Man.	Best Shot in Ship.	Hits made by Best Shot.	Comparison with 1907 Results.	
												Hits, 1907.	Hits, 1908.
102	Clio	2nd	26-15	6	4" Q.F. . . .	37	10	8-22	20-15	F. Mathison, A.B. . .	4	9	10
103	Brilliant . . .	1st	26-06	{	6" Q.F. . . .	9	2	4-50	12-06	F. Hopley, A.B. . .	1	..	2
104	Perseus. . . .	1st	25-50	8	4-7" Q.F. . . .	43	16	7-17	30-72	E. Stevens, A.B. . .	6	..	16
	Pioneer	1st	25-50	8	4" Q.F. . . .	50	13	8-33	25-50	S. Tullock, P.O. (1) .	2	..	13
106	Antrim	1st	25-50	8	4" Q.F. . . .	47	13	7-83	25-50	H. Keogh, L.S. . .	6	..	13
		2nd	25-26	{	7-5" B.L. . . .	27	11	3-86	25-18	W. Jennings, P.O. (2) .	5	7	11
				6	6" B.L. VII. (a)	39	12	6-50	24-64	H. Hibbert, Lee-Sgt., R.M.L.I.	4	21	12
107	London. . . .	2nd	25-19	{	12" Mark IX. . .	14	2	2-55	10-00	C. Brown, P.O. (1) . .	2	2	2
108	Hebe*	1st	25-14	2	6" B.L. VII. (b)	63	27	5-25	27-72	E. Flaye, Sgt., R.M.A.	7	52	27
	Jason*	2nd	25-14	2	4-7" Q.F. . . .	15	4	8-18	25-14	F. Prowse, A.B. . .	4	..	4
111	Speedy*	2nd	25-14	2	4-7" Q.F. . . .	10	4	5-45	25-14	H. Cowar, A.B. . .	3	1	4
				2	4-7" Q.F. . . .	10	4	5-45	25-14	G. Childerhouse, A.B.	3	1	4
112	Arrogant . . .	1st	24-85	{	6" Q.F. . . .	11	3	5-50	18-09	G. Bell, Pte., R.M.L.I.	2	..	2
113	Halcyon	1st	24-12	8	4-7" Q.F. . . .	58	18	7-25	25-92	A. Brown, A.B. . .	5	..	18
114	Leda	2nd	23-04	2	6" Q.F. . . .	45	20	4-50	24-12	A. Prew, P.O. (1) . .	5	..	20
115	Pelorus. . . .	2nd	21-57	8	4-7" Q.F. . . .	18	4	9-00	23-04	T. Orange, A.B. . .	4	5	4
					4-7" Q.F. . . .	16	4	8-00	23-04	S. Nacey, P.O. (1) . .	4	6	4
116	Furious	2nd	20-50	10	6" Q.F. . . .	50	11	8-33	21-57	R. Kettles, Pte., R.M.L.I.	5	8	11
117	Psyche	1st	13-73	8	4" Q.F. . . .	61	17	6-10	20-50	A. Cook, L.S. . .	4	14	17
					4" Q.F. . . .	51	7	8-50	13-73	C. Allison, P.O. (2) .	2	..	7

• Fired 55 seconds.

(a) = full or 1 charges.

(b) = 4 charges.

TEST OF GUNLAYERS, 1908.

12-in. B.L.

Time—1 Run of $2\frac{1}{2}$ minutes per Turret.

Gun.	Best Ship.	Total Number of			Average per minute. Rounds.	Hits per minute.
		Guns.	Rounds.	Hits.		
12-in. B.L.	Dreadnought (Home) . .	5*	53	35	3.85	2.55
	Hibernia (Channel) . .	2	19	14	3.45	2.55
Totals 1907. . . .		71	503	155	2.64	0.81
" 1908.		71	533	217	2.73	1.11
Difference . . . .		..	+30	+62	+0.03	+0.29
9.2-in., Mark X. . .	Good Hope, 1st Cruiser .	2	18	14	4.50	3.50
Totals 1907. . . .		72	535	294	3.72	2.04
" 1908.		80	585	380	3.65	2.37
Difference		+8	+50	+86	-0.07	+0.32
7.5-in. B.L.	Warrior, 5th Cruiser . .	4	40	28	5.71	4.00
Totals 1907. . . .		60	506	164	4.86	1.57
" 1908.		60	509	263	4.84	2.50
Difference . . . .		..	+3	+99	-0.02	+0.92
6-in. B.L., Mark XI. .	Hibernia (Channel) . .	10	77	54	7.70	5.40
Totals 1907. . . .		50	364	210	7.23	4.20
" 1908.		50	349	204	6.98	4.08
Difference . . . .		..	-15	-6	-0.3	-0.12
6-in. B.L., Mark VII. & VIII.	Good Hope, 1st Cruiser .	16	140	106	8.75	6.63
Totals 1907. . . .		512	3679	1727	7.30	3.42
" 1908.		514	3629	2072	7.06	4.03
Difference		+2	-70	+345	-0.24	+0.60
6-in. Q.F.	Argonaut, Home	16	187	105	8.56	6.56
Totals 1907. . . .		366	2311	1061	6.59	3.02
" 1908.		264	1753	1021	6.64	3.86
Difference		-102	-558	-40	+0.05	+0.84
4.7-in. Q.F.	Astraea, China	8	76	45	9.50	5.63
Totals 1907. . . .		92	712	228	7.95	2.54
" 1908.		92	724	320	7.92	3.50
Difference . . . .		..	+12	+92	-0.03	+0.95

* Turrets.

12-in. B.L. 1 run of $2\frac{1}{2}$ minutes per turret.

9.2-in. 1 run of 2 minutes.

7.5-in. 1 run of $1\frac{1}{2}$ minutes.

6-in. B.L. and Q.F. and

4.7-in. Q.F. 1 run of 1 minute.

BATTLE PRACTICE.

ABSTRACT OF RESULTS OF BATTLE PRACTICE IN
H.M. FLEET, 1908.

Order of Merit.	Squadron.	No. of Ships.	No. of Guns.	Average Points.	First Ship in Squadron.	Score.
1	Home Fleet . . .	21	268	285·2	Indomitable . .	562·5
2	China	4	60	219·7	King Alfred . .	296·8
3	Mediterranean . .	12	166	196·9	Glory	303·6
4	Channel	21	316	145·9	Drake	317·7
5	Atlantic	5	80	104·4	Albemarle . . .	236·6

FIRED AT FIXED TARGET.

1	Australia	9	90	196·6	Challenger . . .	397·7
2	Cape of Good Hope .	2	18	138·8	Pelorus	203·1
	Total 1908 . .	74	998	183·93		

NOTE.—As pointed out in the Memorandum prefixed to the official Return, the conditions of the practice presented considerably greater difficulty than in 1907, and it is satisfactory to note that such good results were obtained. Owing to the different conditions of the practice, the system of calculating the points has been revised, and the points are therefore not directly comparable with those for 1907.

Austro-Hungarian Navy Estimates, 1909-10.

(Converted at £1 = 24 Kronen.)

Heads of Expenditure.	Estimates, 1909-10.	Estimates, 1908-9.	
ORDINARY ESTIMATES.			
	£	£	
Pay of Officers, etc.	237,851	207,582	
Pay and Clothing—petty officers and seamen	509,583	184,482	
Land Service	105,524	93,427	
Sea Service	282,792	264,105	
Shore Establishments	29,502	28,848	
Maintenance of Fleet	446,556	425,905	
<i>New Construction, viz. :—</i>			
(A) Hulls and Machinery	Battleship Erzherzog Franz Ferdinand, 14,500 tons, 3rd instalment	250,000	208,333
	Battleship Radetsky, 14,500 tons, 3rd in- stalment	125,000	83,333
	Battleship Zrinyi, 14,500 tons, 3rd instal- ment	83,333	83,333
	Cruiser Admiral Spaun, 3,500 tons, 2nd in- stalment	83,333	83,333
	12 Torpedo-boats, 100 tons, 2nd instalment.	41,667	41,667
(B) Guns, torpedo fittings, &c., for above-named vessels	249,993	216,667	
Guns and Small Arms	146,917	145,042	
Miscellaneous	181,639	175,947	
	2,473,695	2,242,004	
Less Special Receipts	15,885	11,874	
Total of Ordinary Estimates	2,457,810	2,230,130	
EXTRAORDINARY ESTIMATES.			
Pay and Clothing, &c.	4,792	—	
Shore Establishments, Charts, etc.	125	937	
Floating-Dock	62,500	62,500	
Large Alterations, Kaiserin M. Theresia and Erzherzog Albrecht	25,000	—	
Guns and Small Arms, Torpedo Fittings, Mines, &c.	29,166	38,750	
Buildings	50,104	30,583	
Miscellaneous	13,750	12,100	
	£2,643,247	£2,375,000	

French Navy Estimates, 1909.

Cap. in Esti- mates, 1908.	Heads of Expenditure.	Credits voted for 1909.	Credits voted for 1908.
	PERSONNEL.	£	£
1, 2	Admiralty Office	153,633	152,145
5, 6, 7	Navy Pay	2,318,608	2,270,803
8	Inspection of Administrative Services .	13,137	13,137
9, 10	Construction and Ordnance Staff . .	300,035	299,880
11, 12, 14, 15	{ Administrative Staff, Commissariat, and Inscription Maritime }	314,411	312,421
13	Medical and Religious Staff	76,562	73,280
52	Fisheries and Navigation	34,882	33,276
	LABOUR.		
	Wages—		
27	{ Shipbuilding; new construction; fitting for sea }	477,840	485,600
29	Shipbuilding; repairs	217,840	236,000
24, 31	{ Master-attendants' and Storekeepers' Departments }	279,443	269,043
35	Armaments; construction of new guns .	120,365	94,365
37, 39	Armaments; repairs	111,958	109,071
42	Works	20,800	21,240
18	Victualling	31,800	32,400
20	Hospitals, &c.	16,780	16,780
	MATÉRIEL.		
	Stores and Supplies—		
3	Admiralty	7,680	7,680
28	Shipbuilding in Dockyards	1,440,000	1,558,440
33, 34	Shipbuilding by contract	2,093,000	1,724,000
30, 32	Fitting for sea; maintenance; repairs .	586,000	535,016
	Carried forward . .	£8,614,774	£8,244,577

Cap. in Esti- mates, 1908.	Heads of Expenditure.	Credits voted for 1909.	Credits voted for 1909.
	Brought forward - -	£ 8,614,774	£ 8,244,577
	MATÉRIEL—continued.		
	Stores and Supplies—continued.		
25, 26	{ Repairs, conversions, &c., in dockyards and by contract }	621,175	617,568
36, 38 40	{ Armaments; new guns and conversions; Powder, ammunition, repairs, tools, &c. }	1,264,027	1,140,712
43	Works; new and large alterations.	89,800	69,800
41, 44	{ Ditto; supplementary for defence of military ports }	616,800	604,800
46, 47	Ditto; repairs	57,654	57,654
45	New Naval Hospital, Toulon	28,000	36,000
4	Hydrographic Service	14,200	13,600
16	Clothing, &c.	141,229	144,768
17, 19	Victualling	845,695	861,343
21	Hospitals, &c.	76,400	75,584
48, 49	{ Fuel, lighting, office furniture, printing, &c. }	45,623	44,311
	MISCELLANEOUS.		
22, 23	{ Travelling expenses, freight, allowance for lodgings, &c. }	224,864	219,680
50	Charitable and subscriptions	34,220	44,752
51	Pay of Reserve Officers	35,497	33,893
53	{ Fisheries and Commerce (materials for protection, &c.) }	18,640	18,240
54	Mercantile Marine; Travelling expenses.	5,800	5,800
55	Pensions	615,426	560,221
56	Secret Service	4,000	4,000
	Total	£13,353,824	£12,797,303

**PROGRAMME OF NEW CONSTRUCTION, TO BE CONTINUED OR UNDERTAKEN
IN 1909.—BUILDING IN DOCKYARDS.**

Class.	Names of Ships.	Where Building.	Date of Commencement.	Proposed Date of Completion.	Estimated Cost.	Estimated Expenditure in 1909.
					£	
Battleships. . .	{ Danton . . .	Brest. .	1908	1911	2,077,322	431,300
	{ Mirabeau . . .	Lorient .	1908	1911	2,058,488	433,300
Armoured Cruisers, First-class .	{ Edgar-Quinet .	Brest. .	1905	1910	1,889,051	236,305
	{ Waldeck-Rousseau	Lorient .	1906	1910	1,415,190	238,295
Torpedo-boat Destroyers .	{ Glaive . . .	Rochefort	1905	1909	59,567	10,362
	{ Poignard . . .	"	1905	1909	59,567	17,833
	{ Hache . . .	Toulon .	1906	1909	56,658	5,291
	{ Massue . . .	"	1906	1909	56,658	5,848
Submerines . .	{ Saphir.	Toulon .	1905	1909	212,578	28,326
	{ Topaze					
	{ Turquoise. . . .					
18 Submersibles .	{ Pluviôse Ventôse Germinal Floréal Prairial Messidor Thermidor Fructidor Vendémiaire Brumaire	Cherbourg	1906-1908	1908-1911	744,680	92,683
	{ Primaire } ex Q. 62 & 63					
	{ Nivôse } ex Q. 64 to 66					
	{ Papin } ex Q. 67 to 69					
	{ Fresnel } ex Q. 67 to 69					
	{ Berthelot } ex Q. 67 to 69					
	{ Monge } ex Q. 67 to 69					
	{ Ampère } ex Q. 67 to 69					
	{ Gay-Lussac } ex Q. 67 to 69					
	{ Q. 70 to Q. 110 .					
41 Submersibles .	{ Q. 70 to Q. 110 .	{ Rochefort, Toulon, Cherbourg }	—	—	3,034,977	521,273
Total building in Dockyards					£ 11,558,435	2,232,839

**PROGRAMME OF NEW CONSTRUCTION, TO BE CONTINUED OR UNDERTAKEN
IN 1909.—BUILDING BY CONTRACT.**

Class.	Names of Ships.	Where Building and to be Completed.	Date of Commence- ment.	Proposed Date of Com- pletion.	Estimated Cost.	Probable Expenditur in 1909.
					£	£
Battleships . .	(Voltaire . .	La Seyne—Toulon. .	1906	1911	2,169,902	453,339
	Diderot . .	St. Nazaire—Brest. .	1906	1911	2,168,702	463,339
	Condorcet . .	„ „ . .	1906	1911	2,166,702	463,339
	(Vergniaud . .	Bordeaux—Toulon. .	1906	1911	2,178,425	500,198
Torpedo Boat Destroyers .	(Spahi . . .	Le Havre—Cherbourg.	1906	1908	76,259	12,700
	Voltigeur . .	Nantes—Lorient . .	1906	1909	86,765	31,403
	Tirailleur . .	Bordeaux—Lorient . .	1906	1909	85,503	30,403
	Chasseur . .	Le Havre—Cherbourg .	1906	1909	85,015	29,160
	Hussard . .	Nantes—Lorient . .	1906	1908	75,187	12,700
	Carabinier . .	Rouen—Cherbourg . .	1906	1908	76,859	12,700
	(Lansquenec (ex-M 61)	„ „ . .	1907	1909	65,899	33,558
	Mameluk (ex-M 62)	Nantes—Lorient . .	1907	1909	65,739	30,438
	Janissaire (ex-M 63)	Rouen—Cherbourg. .	1907	1910	78,705	18,326
	Fantassin (ex-M 64)	Le Havre—Cherbourg .	1907	1909	78,699	39,158
	Cavalier (ex-M 65)	„ „ . .	1907	1910	80,699	29,572
	M 66 to M 75 .	—	1908	1911	812,592	182,888
	M 76 to M 82 .	—	1909	1912	568,815	53,400
Shallow-draught Gunboat	Doudart de Lagrée	Nantes	1908	1909	21,469	12,041
Total building by Contract					£ 10,941,936	2,408,662

German Navy Estimates, 1909.

(Converted at £1 = 20·43 marks.)

ORDINARY PERMANENT ESTIMATES.

Heads of Expenditure.	Proposed for the financial year 1909.	Granted for the financial year 1908.
	£	£
Imperial Navy Office	106,100	99,579
Admiralty Staff	15,484	15,377
Look-out Stations and Observatories	18,962	18,496
Station Superintendencies.	37,495	33,508
Administration of Justice	9,416	8,940
Naval Chaplains and Garrison Schools	8,815	8,144
Navy Pay	1,607,459	1,533,196
Maintenance of Ships in Commission	1,947,226	1,783,015
Victualling	165,723	113,183
Clothing	21,005	21,367
Garrison Works and Administration	95,015	91,724
Lodging Allowance	141,328	132,975
Medical Department.	134,695	121,897
Travelling Expenses, Freight Charges, &c.	177,974	154,076
Training Establishments	27,111	24,031
Maintenance of Fleet and Docks	1,674,120	1,592,421
Ordnance and Fortification	683,926	627,559
Accountants' Department	50,742	47,587
Pilotage, Coastguard, and Surveying Service	38,692	37,014
Miscellaneous Expenses	82,163	79,507
Total of Ordinary Permanent Estimates, carried to } next page	£ 7,043,451	6,543,596
Administration of Kiau-chau Protectorate	7,150	5,647
	7,050,601	6,549,243

SPECIAL ORDINARY ESTIMATES.

Shipbuilding Programme for the Financial Year 1909.

<i>For the Construction of—</i>	£
Battleship Nassau (Ersatz Bayern), 4th and final instalment	238,375
" Westfalen (Ersatz Sachsen)	238,375
Large cruiser Blücher (E),	220,264
Battleship Rheinland (Ersatz Württemberg), 3rd instalment	283,896
" Ersatz Baden,	283,896
Large cruiser (F),	367,110
Small cruiser Colberg (Ersatz Greif), 3rd and final instalment	73,420
" Ersatz Jagd,	73,420
Battleship Ersatz Oldenburg, 2nd instalment	513,954
" Ersatz Siegfried	513,954
" Ersatz Beowulf	513,954
Large cruiser (G)	533,420
Small cruiser Ersatz Schwalbe	122,370
" Ersatz Sperber	122,370
River-gunboat (C), 2nd and final instalment	14,684
Battleship Ersatz Frithjof, 1st instalment	269,210
" Ersatz Hildebrand	269,210
" Ersatz Heimdall	269,210
Large cruiser (H)	244,738
Small cruiser Ersatz Bussard	122,370
" Ersatz Falke	122,370
Tender to Torpedo-experiments ship, 1st instalment	9,789
One Torpedo-boat Division, 2nd and final instalment	445,423
" " " 1st instalment	489,476
Submarines, construction and experiments	489,476
Alteration and improvement of battleships Kaiser class, second instalment	97,896
Alteration and improvement of large cruiser Vineta, 1st instalment	48,948
Alteration and improvement of small cruisers	48,948
Construction of casemates on battleships	29,868
Total	£7,074,894

SUMMARY.

	Proposed for the financial year 1909.	Granted for the financial year 1908.
	£	£
Ordinary Permanent Estimates	7,043,051	6,543,596
New Construction and Alterations	7,074,894	5,596,185
Armaments, Torpedoes, and Mines	3,681,840	2,774,351
Other items	578,830	425,722
Extraordinary Expenditure	1,220,951	1,259,185
Total	£19,594,566	16,599,089

Italian Navy Estimates, 1909-10.

FINANCIAL YEAR 1ST JULY, 1909, TO 30TH JUNE, 1910.

(Converted at £1 = 25 lire.)

	Proposed for 1909-1910.	Revised Estimates, 1908-1909.
ORDINARY EXPENDITURE—GENERAL EXPENSES.		
	£	£
Admiralty	109,926	108,298
Pensions.	307,020	290,320
Expenditure for the Mercantile Marine	407,884	399,558
Total	£ 824,780	798,171
EXPENDITURE FOR NAVAL SERVICES.		
	£	£
General Staff of the Navy	179,720	160,000
Corps of Constructors	77,360	68,400
Medical Service	32,904	30,424
Commissariat Service	41,160	37,318
Pay of Officers, and Wages and Clothing of Men	625,884	596,120
Gratuities, &c.	169,200	160,600
Forts— <i>Personnel</i>	17,720	17,240
Telegraph Service— <i>Personnel</i>	15,000	12,120
<i>Matériel</i>	6,600	6,600
Police (Dockyards)	12,760	11,460
Salaries and Office Expenses	8,592	8,592
Barracks, Maintenance, Lighting, etc.	8,800	8,800
Rents and Water Royalties	2,480	2,924
Ships fitting out, &c.	314,040	314,040
Fuel and Stores for Ships in Commission	337,000	329,000
Victualling	394,736	384,120
Hospital Services	28,800	22,000
Naval Academy and Engineering School	17,668	17,500
Scientific Services— <i>Personnel</i>	4,760	4,760
<i>Matériel</i>	6,560	5,760
Wireless Telegraph Stations, Benadir and Eritrea	4,400	4,400
Workshops, Fortifications, and Stores— <i>Personnel</i>	73,080	63,600
Technical Department (Civil)— <i>Personnel</i>	39,800	38,236
Naval Constructors	26,000	21,840
Law Charges	1,344	1,344
Transport of Materials	8,600	7,200
Works Department—Repairs	101,880	101,880
Plant, Machinery and Tools; Reconstruction and maintenance of Workshops	70,000	72,000
Electric Power, Fuel and Stores for Shore Establishments	62,000	64,000
Materials for construction of new Ships and maintenance of existing Ships—Hulls, Machinery, and Armaments	1,265,589	1,284,165
Wages and Expenses of Dockyard employés	740,000	756,000
Guns, Torpedoes and Small Arms	124,800	120,800
Supernumerary Labour in Dockyards	30,000	30,000
Coast Defence— <i>Matériel</i>	12,000	12,000
Adaptation of Mercantile Auxiliaries	4,000	—
Total (to next page)	£ 4,859,737	4,775,241

The Estimates for 1909-10 provide for the completion of battleships Roma and Napoli; continuation of battleship A, and cruiser S. Marco; commencement of battleship B; and commencement and continuation of various subsidiary vessels, including one submersible.

	Proposed for 1909-1910.	Revised Estimates, 1908-1909.
EXTRAORDINARY EXPENDITURE.		
	£	£
Temporary Civil Staff	10,600	10,800
General Expenses and Half Pay	2,000	1,800
Construction and purchase of Ships, and Materials for the Navy (Law of July 2, 1905)	440,000	440,000
Reorganization of Storehouses and Bakeries . . . . .	..	31,400
„ „ Ammunition Depôts . . . . .	..	35,320
Total	£ 452,600	519,320
SUMMARY.		
	£	£
Ordinary Expenditure—General Expenses	824,780	798,171
Expenditure for Naval Services.	1,859,737	4,775,241
Extraordinary Expenditure	452,600	519,320
Depreciation of Ships in Commission.	140,000	140,000
Rent of Lands occupied by Government	108,323	108,149
Grand Total	£ 6,385,440	6,335,881

Russian Navy Estimates, 1909.

Heads of Expenditure.	Net Estimates, 1909.	Assigned in 1908.
<i>Effective Services—</i>	£	£
Pay, Wages, &c., of Officers and Men	1,376,833	1,178,764
Victualling and Clothing	986,785	972,901
Medical Establishments and Services	98,722	99,619
Martial Law	24,240	24,747
Educational Services	118,088	128,070
Scientific Services	111,121	99,219
Shipbuilding, Repairs, &c.	4,179,376	4,239,519
Armaments	1,183,672	941,567
Works, Buildings, Repairs	513,642	498,127
Miscellaneous	540,838	487,378
Admiralty Office	90,339	83,807
Total Effective Services	9,228,661	8,753,118
<i>Non-effective Services—</i>		
Pensions, Gratuities, &c.	127,018	108,679
<i>Non-recurring Expenditure—</i>		
Under all Votes	—	351,262
Damage by fire, Obukhov Works	—	159,375
Clothing for Black Sea Fleet.	63,431	443,637
Supplementary Vote, Baltic Fleet	476,531	—
Grand Total	£ 9,895,641	9,816,071

United States Navy Estimates, 1909-10.

(Converted at £1 = \$4.8665, being par, as adopted by Congress.)

Objects of Expenditure and Appropriation.	Appropriated for year ending June 30, 1909.	Estimates for year ending June 30, 1910.
	£	£
Pay of the Navy	6,864,785	6,652,770
Pay, Miscellaneous	148,566	168,858
Contingent, Navy	13,357	13,357
Naval Station (for Lepers), Island of Guam	3,082	2,877
Bureau of Navigation	502,689	701,781
" Ordnance	2,207,906	3,625,460
" Equipment	1,936,679	1,946,640
" Yards and Docks	293,727	314,394
Public Works under Bureau of Yards and Docks	957,444	2,016,178
Public Works under Secretary of Navy (Naval Academy)	9,658	15,411
Public Works under Bureau of Navigation (Training Stations and War College)	259,938	186,324
Public Works under Bureau of Ordnance	31,308	83,082
Public Works under Bureau of Equipment	2,055	2,055
Public Works under Bureau of Supplies and Accounts	—	3,268
Public Works under Bureau of Medicine and Surgery	73,975	—
Bureau of Medicine and Surgery	79,112	87,331
" Supplies and Accounts	1,583,300	1,589,542
" Construction and Repair	1,685,569	1,849,936
" Steam Engineering	1,296,500	1,533,920
Naval Academy	100,077	109,667
Marine Corps	1,427,876	1,864,203
*Increase of Navy:—		
Construction and Machinery	2,637,000	2,987,936
Torpedo Boats, Submarines	616,459	369,876
Colliers	308,229	431,522
Purchase of Steam Colliers	323,641	—
Armour and Armament	2,260,351	1,027,432
Equipment	82,195	82,195
Total	£25,205,478	£27,616,035

* The Naval Appropriation Bill, reported in the House of Representatives in January, 1909, called for a total appropriation of £27,876,891. Under the head of Increase of Navy, the following amounts were recommended:—

Construction and Machinery	£4,678,280
Torpedo Boats, Submarines	616,459
Armour and Armament	2,568,877
Equipment	123,292

These recommendations were adopted by the House and the Senate. The Bill became law on March 3rd., the total amount appropriated being £28,138,261. The naval construction programme provides for two battleships, to cost, exclusive of armour and armament, £1,232,920; five destroyers, one fleet collier, four submarines, and three torpedo-boats.

THE FORTH AND CLYDE SHIP CANAL.

NOTE BY LORD BRASSEY.

It seems fitting, in the present issue of the *Naval Annual*, to call attention to the proposal for a canal from the Forth to the Clyde, recently laid before the Royal Commission on Canals and Inland Navigation by Messrs. Stevenson, Civil Engineers, of Edinburgh. By the route suggested, the distance from the Clyde to Aberdeen would be reduced by 320, Forth to Liverpool 480, Belfast to the Elbe, 272 miles. The proposed scheme avoids those difficulties of navigation which arise in the Pentland Firth from bad weather and the frequent obscuring of the numerous lighthouses by fog.

To the Navy, a canal from the Forth to the Clyde would afford ready access to the Clyde shipbuilding yards, thus rendering a large repairing establishment at Rosyth less necessary. The strategical advantages need no demonstration.

Turning to the engineering features, the proposed canal would begin at or near Grangemouth, on the Forth, which would be deepened from Grangemouth up to the locks, a mile below Alloa. At this point the canal would leave the River Forth and pass to the south of Stirling, by St. Ninians, right up to the foot of the hills, close to Loch Lomond. To enter Loch Lomond it would be necessary to excavate a cutting eight miles in length and 260 feet at its greatest depth. Ships would pass up Loch Lomond to Tarbet, whence the canal would be carried to Arrochar by a cutting, the deepest part of which would be 130 feet. The exit into the Clyde would be by Loch Long.

Messrs. Stevenson have proposed to make the canal 100 feet wide, with a depth of 31 feet of water, the locks to be 900 feet long, by 100 feet wide. The first estimate of cost is put at about £17,000,000. It is assumed by Messrs. Stevenson that shipowners would be prepared to pay dues at the rate of 1s. 6d. per ton. If these calculations are justified, the subsidy to be required from the Government would not exceed £150,000 per year. The experiences of other ship canals are not discouraging. On the Kiel Canal traffic is rapidly increasing. The route is more and more preferred to that

round the Skaw. For similar reasons the Clyde and Forth Canal must be preferred to the outer route by the Pentland Firth.

A lively interest has been shown in Glasgow in the project under review. Resolutions passed by the Corporations of Glasgow, Greenock, and Stirling give some ground for hope that aid may be forthcoming from the local resources of Scotland. The main burden will of necessity be borne by the Treasury. The decision of the Government must ultimately rest on Naval rather than commercial considerations. With the latter the Commission on Canals and Inland Navigation will deal in their report. For Naval advice the Government must rely on the Admiralty. The recent expenditure on Naval Works has aggregated over £30,000,000. Spread over a long term, the cost of construction of the Clyde and Forth Canal would not be beyond the resources of this wealthy country.

RECENT NAVAL CONSTRUCTION.

By the Right Hon. LORD BRASSEY, G.C.B., D.C.L., Past-President.

[Read at the Fiftieth Session of the Institution of Naval Architects, March 31st, 1909.]

IN preparing a paper dealing with technical questions of extreme difficulty and complexity, which is to serve as a target to the skilled gun-layers of this Institution, the layman is bound to entrench himself behind leading authorities, as well naval as professional. In recent years official pronouncements have been few. We have had no information from committees on designs. The Statements and Minutes of First Lords give us the considered judgments of their naval advisers. Balanced arguments are not presented. It is wise on the part of those in responsible administrative positions to refrain from giving occasion for doubt or question. Many distinguished naval officers and naval writers, unfettered by the trammels of office, have stated their opinions in publications of the highest merit. Few readers can claim to have kept pace with the full flow of naval literature.

In considering programmes of construction, battleships stand first in order. Those now building for every maritime Power are of the Dreadnought type. Unanimity of professional opinion in relation to construction is weighty, though perhaps less conclusive than some may think. In a paper contributed to the last issue of *Jane's "Fighting Ships,"* Colonel Cuniberti, the eminent Italian constructor, has some interesting observations on the influence of the imitative sense on contemporary shipbuilding for the purposes of war. "The needs," he says, "of every country differ. Their constructors build types almost identically the same. . . . The number of experts scattered about the world who, with pencils in their hands, are designing ships, is small. Some of these, certainly, whilst having one eye on their own design, have the other turned to the drawing-board of their opposite number." Unanimity has been reached, not as the result of independent investigation, but by imitation of British designs.

These remarks are not made in disparagement of the Dreadnought. To the British Admiralty belongs the credit of producing the first specimen of a new class of battleship, showing a marked advance over all preceding types in speed and in guns of the heaviest calibre. The coal-endurance is sufficient for ocean passages. Occasions may arise in naval warfare when superiority in speed and big-gun armament might decide the issue. It is necessary to secure a preponderance for the British Navy in Dreadnoughts.

In his recent volume on Naval Administration, Captain Mahan insists on the objections to continual increase of dimensions:—"When a certain speed has been attained, a small increment must be purchased at a very great sacrifice. What shall the sacrifice be? Gun power? Then your vessel, when she has overtaken her otherwise equal enemy, will be inferior in offensive power. Armour? Then she will be more vulnerable. Something of the coal she would carry? But the expenditure of coal in ever-increasing ratio is a vital factor in your cherished speed. If you can give up none of these things, will you increase the size? . . . Will you have smaller numbers with larger individual power? Then you sacrifice power of combination."

There are considerations in connection with armaments. "The main instrument," says Sir Cyprian Bridge, "is the gun, and it is its fire that has to be concentrated. If the ships are distributed at suitable intervals, the enemy's return fire must be either divergent or be only imperfectly concentrated. . . . The mounting of very heavy armaments in single ships reduces numbers. . . . This constitutes an obstacle to the desirable tactical dispersion." So, too, Sir Reginald Custance. In his chapter on the Battle of Tsushima, the gallant author shows how "the fire of sixty-three guns was concentrated on the leading ships of the Russian line. Shells rained on their decks. They were enveloped in a sheet of flame. The great principle of dispersing the guns to concentrate their fire was emphasised and confirmed."

With increase of dimensions we have not secured invulnerability. It is not possible to protect the whole area of side above water with impenetrable armour. In the war in the Far East, the mine was a deadly weapon.

If we were creating a new navy for the defence of the British Empire, it would be desirable to lay down a proportion of ships of moderate dimensions. We are relieved of this necessity. We have, as Mr. McKenna has said, a mighty fleet of ships earlier than the Dreadnought. The forthcoming volume of the *Naval Annual* will give a list of forty-four British battleships. Classing the Lord

Nelsons for the time being as Dreadnoughts, we have no less than thirty-eight other ships, of which the oldest was launched in 1894. Collectively, these ships carry one hundred and forty-four 12-in. guns, eight 10-in. guns, thirty-two 9·2-in. guns, twenty-eight 7·5-in. guns, and four hundred and twenty-eight 6-in. Q.F. They are heavily armoured. Speed 18 to 20 knots an hour. With brave and well-trained men behind the guns, and under the command of captains reared in a service which has no record of failure, we have a fleet of vessels which well answer in these later days to the two-deckers of the glorious past.

It is not necessary to dwell on the armoured cruisers. The type has disappeared from the latest programmes of construction. Equal in dimensions and in cost, with a slight inferiority in armament and armour, but with a steaming power equal to 25 knots at sea, the four ships of the Invincible type, and the Indefatigable, should certainly be included in the Dreadnought class in any comparison of naval strength. Armoured cruisers cost as much per ton as battleships. Our appropriations to cruiser construction have not been approached under any other naval administration. In the view of many naval authorities, it would have been well to have spent less on armoured cruisers and more on battleships.

It remains to refer briefly to the inshore squadron. The Dreadnoughts are essentially ships for the open seas—beyond the range of the torpedo, and free from the danger of the floating mine. In narrow and shallow waters, in the southern part of the North Sea, with all lightships and buoys removed, navigation would be hazardous in the extreme. At night, and in thick weather, the torpedo would become a most formidable assailant. The gun is a useless weapon against an invisible foe. The naval experience and professional skill which have produced our noble fleets for the open waters should now be directed to the creation of a type specially designed for the inshore squadron. The Monitor, the armoured ram, as designed by Admiral Ammen, U.S.N., and the protected torpedo-vessel, as exemplified in our own Polyphemus, are types of a past era, which might still be found effective in modern warfare.

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